INTERIM REPORT TO CONGRESS

PATTERNS OF HEALTH CARE UTILIZATION IN THE NONELDERLY MEDICAID POPULATION OF SELECTED STATES

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TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	ES-1
SECTION 1. INTRODUCTION	1-1
SECTION 2. RESEARCH APPROACH	2-1
2.1 Hospital inpatient analysis	2-1
2.2 Ambulatory care analysis	2-15
SECTION 3. RESEARCH RESULTS	3-1
3.1 Hospital inpatient analysis	3-1
3.2 Ambulatory care analysis	3-31
SECTION 4. IMPLICATIONS AND NEXT STEPS	4-1
APPENDICES	
A. Literature review	A-1
B. Inpatient conditions and associated diagnosis related groups	B-1
C. Tables for all inpatient conditions	C-1
D. County-level inpatient utilization tables and maps for the Medicaid population	D-1
E. County-level ambulatory utilization tables and maps for the Medicaid population	E-1
F. Breakdown of inpatient discharges by payor source	F-1
G. Supplementary analysis of ambulatory procedures	G-1
H. State Medicaid program characteristics	H-1
REFERENCES	R-1

LIST OF TABLES

		Page
3.1	Summary inpatient conditions: California, 1985-1986	3-3
3.2	Summary inpatient conditions: New York, 1985-1986	3-6
3.3	Summary inpatient conditions: Iowa, 1985-1987	3-9
3.4	Inpatient conditions with highest Medicaid volume: California, 1985-1986	3-12
3.5	Inpatient conditions with highest Medicaid volume: New York, 1985-1986	3-20
3.6	Inpatient surgeries with highest Medicaid volume: New York, 1985-1986	3-22
3.7	Inpatient conditions with highest Medicaid volume: Iowa, 1985-1987	3-24
3.8	Overlap of highest volume inpatient conditions, by State	3-26
3.9	Inpatient conditions with lowest observed to expected ratio, by State	3-29
3.10	Overall ambulatory utilization within Medicaid, by State	3-32
3.11	Utilization of EPSDT services: California, 1983-1984	3-35
A.1	Utilization rates per 1,000 persons, by type of service, Medicaid eligibility group, and poverty status: U.S. 1980	A-21a
A.2	Ratios between utilization rates for Medicaid and non-Medicaid groups, by type of service: U.S. 1980	A-24a
A.3	Percent of persons reporting regular source of care by type of health insurance coverage: U.S. 1980	A-29a
C.1	All inpatient conditions: California, 1985-1986	C-1
C.2	All inpatient conditions: New York, 1985-1986	C-8
C.3	All inpatient conditions: Iowa, 1985-1987	C-15

LIST OF FIGURES

		Page
D.1	Index of county clusters, California	D-3
D.2	Within Medicaid observed versus expected rates by county, all nonpregnancy-related admissions, California, 1985-1986	D-8
D.3	Within Medicaid observed versus expected rates by county, all medical admissions, California, 1985-1986	D-12
D.4	Within Medicaid observed versus expected rates by county, all surgical admissions, California, 1985-1986	D-15
D.5	Index of county clusters, New York	D-18
D.6	Within Medicaid observed versus expected rates by county, all nonpregnancy-related admissions, New York, 1985-1986	D-23
D.7	Within Medicaid observed versus expected rates by county, all medical admissions, New York, 1985-1986	D-27
D.8	Within Medicaid observed versus expected rates by county, all surgical admissions, New York, 1985-1986	D-31
D.9	Within Medicaid observed versus expected rates by county, all psychiatric admissions, New York, 1985-1986	D-34
E.1	Index of county clusters, California	E-3
E.2	Within Medicaid observed versus expected rates by county cluster, outpatient total utilization, California, 1985-1986	E-9
E.3	Index of county clusters, Georgia	E-11
E.4	Within Medicaid observed versus expected rates by county cluster, outpatient total utilization, Georgia, 1983-1984	E-19
E.5	Index of county clusters, Michigan	E-20
E.6	Within Medicaid observed versus expected rates by county cluster, outpatient total utilization, Michigan, 1984-1985	E-26

LIST OF FIGURES, continued

		Page
E.7	Index of county clusters, Tennessee	E-28
E.8	Within Medicaid observed versus expected rates by county cluster, outpatient total utilization, Tennessee, 1985-1986	E-34
G.1	Outpatient procedure codes	G-2

EXECUTIVE SUMMARY

Section 9432(c) of the Omnibus Budget Reconciliation Act of 1986 mandated a study of the appropriateness, necessity, and effectiveness of treatments and procedures provided to Medicaid recipients. Following discussions with congressional staff, the study was focused on the nonelderly Medicaid population. This interim report presents results from the first phase of a project designed to address this mandate. The report presents data on patterns of utilization for approximately 130 hospital inpatient conditions and selected ambulatory care services in a sample of States. It examines whether treatments and procedures are performed more in the Medicaid population than in the non-Medicaid population, and whether these treatments and procedures are performed more in one geographic area than another within the Medicaid population. Such analysis is informative because large differences between Medicaid and non-Medicaid populations, or large amounts of variation from one geographic area to another, may signal issues of appropriateness or access to care.

There are several limitations about this research which should be noted. First, the analysis is for only selected States, and thus may not be representative of all Medicaid programs. Individual-level data with detail sufficient to perform required analyses are available for only a few States. The data used in this analysis were the most comprehensive data of sufficient quality readily available at the time. Even though

not strictly representative, results from this analysis can provide a useful initial indication of patterns of utilization in the Medicaid population.

Second, even in States with the required basic data, it is difficult to make precisely accurate and comparable estimates for Medicaid and non-Medicaid populations. At times our methodology required that imperfect estimates be used in our calculations. Therefore numeric comparisons presented in this analysis should be viewed as approximations.

Finally, utilization analysis such as this cannot definitively assess the quality of care received by Medicaid patients; there may be valid reasons for utilization differences observed. However, such research can help identify potential issues, and thus is a useful first step in beginning to look into the quality of care in Medicaid.

With these limitations in mind, a number of general points from this analysis are worth summarizing. First, differences were apparent in the patterns of utilization involving the Medicaid population. For example, the overall observed rate of inpatient utilization in the Medicaid population was substantially higher than the rate expected based on non-Medicaid utilization patterns; the difference was more pronounced for medical than surgical conditions.[1]

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[1]Expected rates are rates expected in the Medicaid population if it had the same age and sex-specific utilization patterns as the non-Medicaid population; the non-Medicaid population includes privately insured and uninsured.

Second, relatively few specific conditions account for a large part of the total inpatient activity in the Medicaid population. Several of these conditions exhibit patterns that make them likely candidates for further indepth study. Pediatric bronchitis and asthma consistently was the highest volume medical condition in the Medicaid population. The rate observed for this condition was notably higher than the rate expected based on non-Medicaid utilization, and it generally exhibited high geographic variation within the Medicaid population. Several other medical conditions also were relatively high in volume and exhibited notable differences in utilization, and include: adult bronchitis and asthma, both pediatric and adult gastroenteritis, pediatric pneumonia, and malignancy and infections of the female reproductive system.

Hysterectomy and cholecystectomy consistently were among the highest volume inpatient surgeries in the Medicaid population, with hysterectomy exhibiting more geographic variability in two of the three sample States (variability for the two procedures was comparable in the third State).

Pregnancy-related conditions by far are the major source of inpatient admission in the Medicaid population under age 65. The volume alone suggests that this is an important area to include in any assessment of care in Medicaid. The higher rate of admission for postpartum conditions in Medicaid also points to the need for further inquiry in this area.

Finally, though not as pronounced as often observed for

specific treatments, the rate of overall ambulatory care utilization observed in the Medicaid population exhibited notable variation between geographic areas in some States.

We particularly have been interested in using results from this research to inform the indepth quality assessments planned for the second phase of this project. In Phase II we will build on the results presented here and will focus on a small number of procedures using methods that will allow a more direct and detailed assessment of the appropriateness, necessity and effectiveness of care received by the Medicaid population.

The work planned for Phase II is divided into several parts. The centerpiece of the Phase II effort will be a major medical record review to assess the quality of inpatient care received by Medicaid patients. In selecting conditions to include in this record review we wanted to cover certain broad areas especially relevant to the nonelderly Medicaid population; namely conditions important among children, adult females, and pregnant women. Our selection of conditions to fit these categories reflects conditions identified as likely candidates in the utilization analysis conducted for this interim report. We chose pediatric asthma as the condition for children; hysterectomy as the condition for adult females; and complicated delivery, including Caesarean section, as the condition for pregnant women. The analysis will provide an indepth clinical comparison of the care received by Medicaid and non-Medicaid populations for these conditions.

We plan to supplement this medical record review with an analysis of secondary data for Medicaid and privately insured populations which will explore differences in: (1) process and outcomes of care for select conditions highlighted in this interim report, (2) preventable morbidity and mortality, and (3) prenatal care and pregnancy outcomes.

We also are conducting additional research which follows up on issues highlighted by the utilization analysis presented in this report. Our ambulatory care analysis directed attention to the issue of access to physician providers in Medicaid, and we currently are conducting a study designed to further examine issues in physician fee levels, patterns of provider participation, and access in Medicaid.

In summary, little prior research has focused on the appropriateness, necessity, and effectiveness of care received in Medicaid. An examination of the patterns of utilization in this interim report serves to identify treatments and procedures that may serve as likely candidates for further inquiry. The second phase of this project and subsequent research will build on these results by conducting detailed and indepth examinations of issues concerning the quality of care in Medicaid.

SECTION 1. INTRODUCTION

Medicaid is a Federal and State financed and State-administered assistance program designed to provide medical care for selected low income populations. In Fiscal Year 1990, Medicaid served 25 million recipients at a cost of almost $65 billion. While the program strives to ensure that high quality medical care is provided to all program enrollees, actual empirical research on the appropriateness, necessity, and effectiveness of care received by the Medicaid population is limited.[1]

Against this backdrop, section 9432(c) of the Omnibus Budget Reconciliation Act of 1986 (OBRA-86) mandated a study to assess and analyze the quality of Medicaid health care services. The legislation mandates the following:

A. The Secretary shall conduct a study of the utilization of selected medical treatments and surgical procedures by Medicaid beneficiaries in order to assess the appropriateness, necessity, and effectiveness of such treatments and procedures.

B. The study shall analyze the extent to which there is significant variation in the rate of utilization by Medicaid beneficiaries of selected treatments and procedures for different geographic areas within States and among States.

C. The study shall also identify underutilized, medically necessary treatments and procedures for which --

   i. a failure to furnish could have an adverse effect on health status, and

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[1]Appendix A reviews the quality of care literature as it relates to Medicaid. See also Jencks and Benedict (1990).

ii. the rate of utilization by Medicaid beneficiaries is significantly less than the rate for comparable, age-adjusted populations.

The study subsequently was divided into two parts by section 411(k)(10)(M) of the Medicare Catastrophic Coverage Act of 1988.[2] Phase I of the study was to examine variations in rates of Medicaid utilization (paragraph B. of the mandate), and Phase II of the study was to address the remainder of the mandate. This interim report presents results from Phase I of the study.

As noted above, Phase I represents a study of patterns of utilization. For the purposes of this study, this entails examining whether treatments or procedures (e.g., hysterectomy) are performed more in one geographic area than another within the Medicaid population, and also whether treatments and procedures are performed more overall in the Medicaid population than in the non-Medicaid population.

Why study patterns of utilization? The answer lies in what these patterns can suggest to us about potential problems in Medicaid. Large utilization differences between Medicaid and non-Medicaid populations, or large amounts of variation from one geographic area to another within the Medicaid population may signal issues related to appropriateness or access to care. This type of analysis cannot ever be definitive--there may be valid reasons for observed differences in utilization--but it can help

[2]This section of the Medicare Catastrophic Coverage Act was not repealed.

identify where there might be problems. These analyses are a useful first step in beginning to look into the quality of care in Medicaid.

This report examines patterns of utilization for both hospital inpatient conditions and selected ambulatory care services in a sample of States. For the inpatient analysis, information is presented on patterns of utilization for approximately 130 different treatments and procedures, defined on the basis of clusters of related diagnosis related groups. Because of limitations of available data, the ambulatory care analysis is more limited in scope than the inpatient analysis. However, sufficient data were available to explore a number of useful topics concerning Medicaid ambulatory care utilization, including geographic differences in overall ambulatory utilization and utilization of preventive care services by Medicaid children. (Phase II of this study also will include an analysis of prenatal care in Medicaid.)

By examining these treatments and procedures, we will attempt to identify potential issues in the quality of care in Medicaid. We especially were interested in using the information from this interim analysis to inform the indepth quality assessments planned for the second phase of the project. Phase II of the project will include a review of medical records and detailed secondary data analyses for selected conditions highlighted in this report. In the final section we will overview the Phase II work now in progress which builds on the results presented here.

SECTION 2. RESEARCH APPROACH

This report examines patterns of utilization for hospital inpatient conditions and selected ambulatory care services. Based on discussions with congressional staff, the analysis has been focused on the nonelderly population. Thus all analyses are based on the population under age 65.[3] In order to understand results that are presented later, a discussion of the data and methods used in these analyses is provided.

2.1 Hospital inpatient analysis

It is difficult to obtain individual-level data with detail sufficient to perform required analyses that is comparable for Medicaid and non-Medicaid populations. We were able to obtain data of sufficient quality for only a sample of States. The inpatient portion of this study employs data on medical and surgical conditions derived from statewide, all-payor hospital discharge data bases in three States--California, New York, and Iowa. The data bases contain a separate record for each discharge from participating hospitals. Data are included from all hospitals in the State, except Military and Veterans' Administration hospitals, hospitals categorized as long-term by

[3]Disabled persons under age 65 could not be separately identified in the data bases, and thus are included in the analysis.

the American Hospital Association guide, and hospitals categorized as skilled nursing, psychiatric, alcohol and drug, or rehabilitation.[4,5]

These all-payor data bases offer the unique advantage of containing directly comparable information on large numbers of both Medicaid and non-Medicaid patients. In addition, the records in the data base contain the data elements necessary for performing the utilization analyses specified for this study: payor source (Medicaid versus non-Medicaid), patient origin (county of residence), detailed diagnosis and procedure codes, and patient age and sex.

In order to generate sufficient procedure-specific cases for the analysis, multiple years of data were used (California, 1985-1986; New York, 1985-1986; Iowa, 1985-1987).[6] While these States may not be representative of all Medicaid programs, they accounted for 24.2 percent of all recipients of Medicaid-covered inpatient services in 1985, and 23.4 percent in 1986.

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[4]Some patients in border areas get their care in neighboring States. Data were available for several States bordering on New York, where boundary crossing was extensive, particularly in the New York City area. Our data base includes discharges from these bordering States for people living in New York. The Iowa data base includes all claims for the Medicaid population, even if care was received outside the State. Statewide non-Medicaid rates in Iowa were not substantially affected by care received in other States. Border crossing was not a major issue in California.

[5]Discharges for persons participating in capitated plans are included in the all-payor data bases.

[6]Characteristics of the State Medicaid programs in this period are described in Appendix H.

We also obtained data on the size of each State's Medicaid population from enrollment files of the States' Medicaid Management Information Systems (MMIS), and obtained data on the size of the States' overall populations from updated census counts.[7]

The inpatient analysis includes approximately 130 conditions representing diagnoses and procedures that are relevant to the nonelderly Medicaid population. Using the diagnosis and procedure data on the discharge records, we assigned each discharge to a diagnosis related group (DRG), which in turn was then grouped to generate the conditions to be used in the analysis. The conditions and associated DRGs included in the study are listed in Appendix B.

We used these data to make two basic types of comparisons: (1) Medicaid versus non-Medicaid utilization, and (2) variation in utilization from one geographic area to another within each of the three State's Medicaid population.

Medicaid versus non-Medicaid comparison. This analysis compares utilization rates observed in the Medicaid population to those we would have expected if the Medicaid population had the

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[7]It can be argued that the estimate of the size of the Medicaid population should include: (a) those actually enrolled in the program, and (b) those who could be eligible for the program but have not applied and become enrolled. The latter group cannot be reliably estimated for the purposes of this project. We used counts of actual Medicaid enrollment for the size of the Medicaid population.

same utilization patterns as the non-Medicaid population.

We began this analysis by calculating the observed rate in the statewide Medicaid population for each of the 130 conditions noted above. The calculation of these rates involved obtaining a count of the number of Medicaid discharges for each condition (the numerator of the rate) and an estimate of the size of the Medicaid population (the denominator of the rate).

The numerator data were obtained by selecting all records in the discharge data bases for which the payment source was Medicaid. The diagnosis and procedure data on the records were then used to assign each case to one of the conditions to be used in the study. The numerator data were the counts of the number of Medicaid discharges for each condition.

The denominator data were the Medicaid enrollment counts obtained from the States' MMIS enrollment files. Since there is often substantial movement on and off the Medicaid program, Medicaid population counts need to account for turnover in enrollment. To accomplish this, we calculated "person-years" of enrollment for the denominators of the Medicaid rates. This approach differentially weights individuals by the proportion of the year they were enrolled in the program. For example, a person enrolled for the full year would receive a weight of 1.0, but a person enrolled for 6 months of the year would receive only a weight of 0.5. Thus, for a hypothetical population made up of six people enrolled for the full year and four people each enrolled for 6 months, the count of person-years of enrollment

would be eight [i.e., (1.0 x 6) + (0.5 x 4) = 8]. For simplicity, we hereafter will refer to counts of person-years of enrollment simply as enrollment counts.

The Medicaid observed rate for each condition then was calculated by dividing the Medicaid discharge count for the condition by the Medicaid enrollment count.

We also calculated an expected rate based on non-Medicaid utilization for each of the 130 conditions included in the study. This measure represents the rate expected in the Medicaid population if it had the same utilization pattern as the non-Medicaid population. Obtaining this expected rate entails calculating non-Medicaid utilization rates by age and sex and applying these rates to Medicaid age and sex population characteristics.

Let us begin thinking about the nature of the expected rate by describing the calculation of the non-Medicaid utilization rates. For each condition the numerator of the non-Medicaid rate was obtained from the all-payor data base by collecting all discharges for which the payment source was not Medicaid. The denominator of the non-Medicaid rate was obtained by subtracting the Medicaid enrollment counts from total population counts for the State. The total population counts were obtained from a nationally known demographic consulting firm, and were generated by developing household counts at the census tract level and applying to these counts an estimate of average household size obtained by updating 1980 census values

(for details, see Donnelley Marketing Information Services, 1988).[8]

The non-Medicaid rates for each condition were calculated by dividing the number of non-Medicaid discharges for the condition by the non-Medicaid population counts.

It is not legitimate simply to compare the observed Medicaid rate to this non-Medicaid rate. These rates may differ because of differences in utilization patterns or because of differences in the composition of the two populations. For example, assume that the utilization rate for a given condition is higher for children than adults and that the age-specific rates for the condition are the same for the Medicaid and non-Medicaid populations. If the Medicaid population has a greater concentration of children, then the overall Medicaid rate for the condition would be higher than the overall non-Medicaid rate because of differences in the age distribution of the populations rather than actual differences in utilization.

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[8]The total population counts are not precisely comparable to the Medicaid enrollment counts. Because of substantial movement in and out of Medicaid eligibility, the Medicaid count is based on person-years of enrollment, which differentially weights individuals for the length of time they are enrolled in the program. A comparable measure for the total population would differentially weight each individual for the length of time they lived in the State. We were not able to obtain such a count. Our estimate of the total population in the State is based on an updated census count, which in essence is a point-in-time value which estimates the number of people living in the State on a particular date, rather than a person-year estimate. The direction and magnitude of this bias is unknown. To the extent that movement into and out of the State is low in the period, the bias would be small.

To address this issue, we calculated expected rates that apply non-Medicaid utilization patterns to Medicaid population characteristics. First, we used the procedure described above to calculate age and sex specific non-Medicaid utilization rates for each inpatient condition.[9] We then obtained Medicaid enrollment counts for each age/sex combination. For any given condition the expected rate can be expressed symbolically in the following way:[10]

$$R_n = \frac{E_n}{n_m} = \frac{\sum_{i=1}^{I} (r_{ni} \times n_{mi})}{n_m}$$

where:

- R_n = the expected rate based on non-Medicaid utilization.
- E_n = the expected number of discharges based on non-Medicaid utilization.
- n_m = the total Medicaid enrollment count.
- r_{ni} = the non-Medicaid utilization rate for age/sex group i.
- n_{mi} = the Medicaid enrollment count for age/sex group i.
- I = the total number of age/sex combinations.

This expected rate can be interpreted to represent the rate we would have expected in the Medicaid population if it had the same age and sex-specific utilization pattern as the non-Medicaid population.

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[9]In California the age groupings were 0-4, and 10 year groupings thereafter (e.g., 5-14, etc.). In New York the age groupings were 0-4, 5-20, 21-44, and 45-64. In Iowa 5 year age groupings were used.

[10]This formula can be shown to be equivalent to the expected rate defined by Fleiss (1973, page 158, formula 13.7).

Note that the observed Medicaid rate for any given condition could be expressed as follows:

$$R_m = \frac{O}{n_m} = \frac{\sum_{i=1}^{I} (r_{mi} \times n_{mi})}{n_m}$$

where:

- R_m = the observed rate in the Medicaid population.
- O = the observed number of Medicaid discharges for the condition.
- n_m = the total Medicaid enrollment count.
- r_{mi} = the Medicaid utilization rate for age/sex group i.
- n_{mi} = the Medicaid enrollment count for age/sex group i.
- I = the total number of age/sex combinations.

Any difference between the observed and expected rates is due to differences in utilization between the Medicaid and non-Medicaid populations (i.e., differences between r_{mi} and r_{ni}), and not due to differences in the underlying age and sex distributions of the populations.[11]

For our Medicaid to non-Medicaid comparison we will present the ratio of the observed Medicaid rate to the expected rate based on non-Medicaid utilization. An observed to expected ratio around 1.0 indicates similar utilization in the Medicaid and non-Medicaid populations; a ratio larger than 1.0 suggests higher Medicaid utilization; a ratio less than 1.0 suggests lower

[11]To the extent that there are differences in the age distribution of the populations <u>within</u> the age groupings used in the calculation, the age and sex standardization will not be entirely complete.

Medicaid utilization.

It is important to note several caveats concerning this Medicaid to non-Medicaid comparison. First, only age and sex differences between the populations are controlled. The effects of other differences (e.g., racial composition, health status) remain.

Second, non-Medicaid utilization rates include both the privately insured and uninsured. We were not able to calculate population based rates separately for these non-Medicaid subgroups. One can obtain counts of discharges separately for the privately insured and uninsured from the all-payor data bases. However, it was not possible to obtain sufficiently reliable estimates of the overall number of people who were uninsured at the State level in this period, which would be necessary for calculating the denominator of subgroup utilization rates.[12] Our non-Medicaid rates thus combine data for the privately insured and uninsured and must be interpreted as reflecting overall non-Medicaid utilization. For the interested reader, Appendix F presents a breakdown for each condition of the

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[12]In Iowa, all-payor data are drawn from claims required to be submitted by each insurance carrier in the State, and thus do not include discharges for the uninsured. To maintain consistency with the population count used in calculating the rates (which includes the privately insured and uninsured), the number of non-Medicaid discharges in this State was adjusted by applying the ratio of the known total number of discharges in the State to the total number of discharges reflected in the data base. This adjustment is only a partial correction; the ratio for total discharges may not be completely accurate for specific conditions.

percent of inpatient discharges accounted for by each payor source.

Third, the coding of payor source on the discharge records probably contains some error. In California and New York the categorization of a discharge as Medicaid is based on expected principle source of payment from the hospital discharge abstract, which may not be a completely accurate indicator of Medicaid enrollment.[13] Some patients initially believed by the hospital to be Medicaid eligible are in fact not eligible, and some initially believed not to be eligible are enrolled in the program. The exact extent of this bias could not be ascertained, but informal estimates for the New York data indicate that counts based on expected payment source underestimate actual Medicaid counts (Fanning, 1991). In addition, some Medicaid enrollees participating in capitated plans may have been misclassified as non-Medicaid in the California all-payor data (Spitzer, 1991); the overall effect of this misclassification is probably not large, however.[14]

Finally, note that the denominator used in calculating non-Medicaid rates in each State is an estimate and thus subject to

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[13]The Iowa all-payor data are drawn from actual claims submitted by each insurance carrier in the State, including Medicaid.

[14]Only approximately 10 percent of all Medicaid enrollees participated in capitated plans in California in this period. Thus even if all Medicaid enrollees in capitated plans were misclassified, the overall Medicaid rate would be low by 10 percent.

error.

Because of these limitations, the Medicaid to non-Medicaid comparison should be viewed as a best available approximation but interpreted carefully. This comparison can provide a useful, if rough, indicator of differences in utilization between Medicaid and non-Medicaid populations. Large differences between Medicaid and non-Medicaid utilization can signal potential issues related to appropriateness or access to care.

Geographic variation within Medicaid. In this comparison we want to represent the degree to which there are differences in utilization from one geographic area to another within the Medicaid population. To do this comparison we calculated utilization rates for each inpatient condition for the Medicaid population living in each county in the selected States.[15]

Ignoring for the moment differences in the composition of the Medicaid populations, if the utilization rates for a given condition are the same in all counties, then the county rates will all equal the overall statewide rate. Thus, one way to represent the extent of geographic variation in utilization within Medicaid would be to summarize deviations of the county-level Medicaid rates from the statewide Medicaid rate.

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[15]Geographic areas in Iowa were actually clusters of small areas called hospital market areas, which approximate counties. In some areas in each State it was necessary to cluster counties to generate areas with a sufficiently large number of Medicaid enrollees.

In comparing the observed rate for a given county to the statewide rate, we run into the same problem encountered above--differences in observed rates may reflect differences in patterns of utilization or differences in the underlying demographic composition of the populations. Thus a difference between the observed Medicaid rate in a given county and the observed statewide Medicaid rate may reflect differences in utilization or differences in the age and sex makeup of the Medicaid population living in the county compared to the overall makeup of the Medicaid population in the State.

To address this issue we again drew on the idea of calculating expected rates. For each county we calculated the rate that would have been expected in the county if it exhibited the same pattern of utilization as the overall statewide Medicaid population. In this context, the expected rate for a given condition and county can be expressed as follows:

$$R_s = \frac{E_s}{n_c} = \frac{\sum_{i=1}^{I} (r_{si} \times n_{ci})}{n_c}$$

where:

R_s = the rate expected in the county based on statewide Medicaid utilization.

E_s = the number of discharges expected in the county based on statewide Medicaid utilization.

n_c = the total county Medicaid enrollment count.

r_{si} = the statewide Medicaid utilization rate for age/sex group i.

n_{ci} = the county Medicaid enrollment count for age/sex group i.

I = the total number of age/sex combinations.

Thus for each county (and condition) we calculated an observed rate for the Medicaid population living in the county and an expected rate based on statewide Medicaid utilization. Differences between these observed and expected rates reflect geographic differences in utilization within the Medicaid population, standardized for age and sex population differences.

We combined the differences between the observed and expected values across counties to produce an overall summary measure of geographic variation for each condition. This measure, called the systematic component of variation (SCV), is defined as follows:

$$\text{Let } Y_j = \ln\left[\frac{O_j}{E_{sj}}\right]$$

$$SVC = \left[\sum_{j=1}^{J} Y_j^2 - \sum_{j=1}^{J} \frac{1}{E_{sj}}\right] \times \frac{1}{J} \times 1{,}000$$

where:

SCV	=	systematic component of variation.
Y_j	=	the natural logarithm of the observed to expected ratio of county j.
O_j	=	observed number of discharges in the Medicaid population of county j.
E_{sj}	=	expected number of discharges in the Medicaid population of county j if it had the same age and sex-specific utilization pattern as the statewide Medicaid population.
J	=	total number of counties included (counties with 5 or fewer expected cases are not included in the calculation of the SCV).

The SCV is used widely in the small-area geographic variations literature, and is especially designed for comparing

the degree of variation across conditions within the same population (McPherson et al., 1982).

It is important to note that recent literature suggests that the SCV has a number of limitations (Diehr et al., 1990). In addition to the degree of geographic variation in utilization, the estimate is affected by other factors, including the size of the underlying utilization rate and the number of counties included in the calculation.[16] Thus the SCV should be viewed only as providing an approximation of the relative variation in conditions. In spite of its limitations, the SCV is the best measure of variability currently available for our purposes.

The SCV can provide a rough indication of the extent to which the conditions included in this study exhibit geographic variation within the Medicaid population, and thus help identify potential problems in Medicaid. Large amounts of variation from one geographic area to another may indicate issues related to access or appropriateness of care.

Note that there is variation in Medicaid utilization between States as well. Such patterns are difficult to interpret, however, because they could reflect program differences between the States (for example, differences between the States on coverage policy, payment policy, utilization review, etc.). We therefore will focus here on variation in Medicaid utilization

[16]Other measures of variation commonly used in small area geographic variation applications (e.g., coefficient of variation, extremal coefficient) also suffer from such limitations.

among counties within States.

2.2 Ambulatory care analysis

It proved to be extremely difficult to obtain ambulatory care data of sufficient volume and compatibility to conduct the kind of comparisons needed for this study. Thus, our ambulatory care analysis is more limited in scope than the inpatient analysis. We will examine differences between geographic areas in overall ambulatory utilization within the Medicaid population and will examine patterns of use of preventive services among children covered by Medicaid.[17]

Comprehensive ambulatory data were not available in a single data base to cover planned analyses. The ambulatory portion of the study therefore used separate data sources for different parts of the effort.

As noted, the first part of the analysis examines overall ambulatory utilization within Medicaid. Data for this analysis were drawn from the Health Care Financing Administration's Tape-to-Tape data base, which contains all Medicaid enrollment and claims data from the Medicaid Management Information Systems (MMIS) of California, Georgia, Michigan, and Tennessee. We selected all ambulatory claims for the 2 most recent years

[17]We also conducted a supplementary examination of patterns of utilization for a small number of specific surgical and diagnostic ambulatory procedures for illustrative purposes, which is presented in Appendix G.

available at the time (California, 1985-1986; Georgia, 1983-1984; Michigan, 1984-1985; Tennessee, 1985-1986). These data encompassed claims that were not associated with inpatient or nursing facility stays, and primarily included physician services, clinic and outpatient hospital services, and radiological and laboratory services. The States combined accounted for 26.8 percent of all recipients of physician services in Medicaid in 1985, 20.8 percent of all recipients of outpatient hospital services, 19.1 percent of all recipients of clinic services, and 32.4 percent of all lab and X-ray services.

We used these data bases to compute the rate of overall ambulatory utilization in the Medicaid population of each county of the selected States. The numerator of the rate for each population was the sum of the number of patient days of ambulatory care (i.e., the number of days on which a given patient received at least one ambulatory service). The denominator of the Medicaid rate was the total number of person-years of enrollment, where person-years is defined as above.[18] We examined the degree to which these rates vary between geographic areas.

The second part of the ambulatory analysis examines the utilization of preventive services among children covered by Medicaid. States often provide preventive care to Medicaid children both through their Medicaid program and through

[18]Because this is a claims-based analysis, data for Medicaid enrollees participating in capitated plans are excluded.

administratively separate programs which supply Early and Periodic Screening, Diagnosis, and Treatment (EPSDT) services. Only rarely are linked data files available for the separate programs. We were able to obtain and link data from these programs for California for 1983-1984.[19] Data on the portion of preventive services provided through the California Medicaid program were drawn from the Tape-to-Tape data base, and were supplemented by claims for preventive care provided to Medicaid children under California's EPSDT program.[20]

We used these linked data to examine the provision of the following preventive services to Medicaid-covered children: dental, vision, hearing, and TB screens; hemoglobin/hematocrit test; urine dipstick; urinalysis; polio immunization status check; diphtheria, pertussis, and tetanus (DPT) immunization status check; measles, mumps, and rubella (MMR) immunization status check; nutritional assessment; history and physical; and well-child visits.

We calculated the utilization rate for each preventive service for the population of Medicaid children statewide and for each county in the State. The numerator of these rates is the number of preventive services provided, and the denominator is the number of person-years of enrollment. Again, we explored the

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[19]Children up to age 17 were included in the data base.

[20]EPSDT services in California are supplied through the Child Health and Disability Prevention Program (CHDP); the California Medicaid program is known also as MediCal.

overall use of these services among Medicaid children and the extent to which utilization varies from one geographic area to another.

The systematic component of variation was computed as discussed above in the section on geographic variation within Medicaid for the hospital inpatient analysis.[21]

[21]Expected rates were age and sex standardized using 5-year age groupings.

SECTION 3. RESEARCH RESULTS

In this analysis we will examine patterns of utilization for inpatient conditions and selected ambulatory services in Medicaid. As noted previously, the analysis will examine whether treatments and procedures are performed more in the Medicaid population than in the non-Medicaid population, and whether these treatments and procedures are performed more in one geographic area than another within the Medicaid population. The idea is to examine the utilization patterns associated with these treatments and procedures to identify potential issues in quality of care. We especially are interested in using information from this analysis to inform the selection of conditions and procedures for our indepth quality assessments planned for the second phase of this project.

3.1 Hospital inpatient analysis

For this analysis we explored patterns of utilization for approximately 130 inpatient treatments and procedures for California, New York, and Iowa. We begin the analysis by examining utilization patterns related to several summary measures--totals for nonpregnancy-related conditions, including all medical, all surgical, and all psychiatric conditions; and the total for all pregnancy-related conditions.[19]

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[19]Data for psychiatric conditions are not presented for California because a large part of Medicaid psychiatric utilization may have been misclassified as non-Medicaid due to the way discharges from facilities participating in California's Short-Doyle program were processed (diBernardi, 1991).

Table 3.1 presents these data for California. Columns (a) and (b) provide information on the volume of these summary conditions in the Medicaid population. Column (a) gives the overall number of Medicaid cases for each summary condition, and column (b) gives this number as a percent of total Medicaid admissions. Columns (c), (d), and (e) provide information on the Medicaid to non-Medicaid utilization comparison. Column (c) provides the rate observed in the Medicaid population, column (d) provides the rate expected in the Medicaid population if it had the same utilization pattern as the non-Medicaid population, and column (e) gives the observed to expected ratio. Column (f) provides information on geographic variation in utilization within the Medicaid population, as measured by the SCV.

Several basic points from these data are important to note. First, overall nonpregnancy-related utilization was substantially higher in the Medicaid population than in the non-Medicaid population. The observed Medicaid rate was 8,162 admissions per 100,000 Medicaid enrollees; the expected rate based on non-Medicaid utilization was 4,959 per 100,000. Thus the observed to expected ratio was 1.65, indicating that overall nonpregnancy-related inpatient utilization was about 65 percent higher in Medicaid.[20]

If Medicaid patients encounter problems of access to inpatient care, one would predict that the observed Medicaid rate

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[20]This overall observed to expected ratio should be viewed as an approximation since it includes psychiatric discharges. A number of Medicaid psychiatric discharges are probably misclassified as non-Medicaid and some part of non-Medicaid utilization is omitted because hospitals classified as psychiatric or alcohol and drug treatment are not included in the data base (see below for further discussion). The overall direction and magnitude of this bias is unknown.

Table 3.1
Summary inpatient conditions:
California, 1985-1986

Condition	Medicaid volume (a) Number of Medicaid cases	Medicaid volume (b) Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison (c) Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison (d) Expected rate b,a/	Medicaid vs. non-Medicaid comparison (e) Observed/expected ratio	(f) Geographic variation within Medicaid (SCV) c/
Nonpregnancy-related d/:	463,925	61.8	8,162	4,959	1.65	47.3
Medical	307,594	41.0	5,411	2,757	1.96	58.8
Surgical	115,761	15.4	2,037	1,890	1.08	75.5
Psychiatric	33,996	4.5	e/	e/	e/	e/
Pregnancy-related	286,595	38.2	f/	f/	f/	f/

a/ The rate represents the number per 100,000 Medicaid enrollees.

b/ The expected rate is the rate expected in the Medicaid population if it had the same age and sex-specific utilization pattern as the non-Medicaid population.

c/ Systematic component of variation; based on county-to-county differences in Medicaid utilization.

d/ The total for nonpregnancy-related conditions does not equal the sum of medical, surgical, and psychiatric conditions because a small number of cases are included in the total but could not be classified.

e/ Value is not presented because of problems of missing data. In addition, a large part of Medicaid psychiatric discharges funded through the California Short-Doyle program probably are misclassified as non-Medicaid.

f/ Rates for pregnancy-related conditions are based on the number of deliveries, and thus are not presented for the summary measure.

NOTE: All analyses are based on the population under age 65.

to be lower than the expected rate based on non-Medicaid utilization patterns. Thus, these results may be taken to indicate that access to inpatient care in Medicaid is less of a problem than often believed.

Other interpretations are possible, however. For example, the higher Medicaid utilization also may reflect greater underlying morbidity in this population. As previously noted, we could not adjust the rates for possible health status differences between the groups. Higher morbidity may be expected in the Medicaid population because program eligibility is based on factors related to poor health status. For example, income is a major criterion for Medicaid eligibility and a number of studies have shown that low income is associated with poor health status. In addition, in some circumstances individuals become eligible for the program because of physical or mental disabilities. Further, the States included in the inpatient analysis covered the medically needy, who become eligible for Medicaid because they have high medical expenses. Also, some people who are eligible for Medicaid but not previously enrolled may choose to enroll in the program when they have actual medical needs.

The higher observed inpatient utilization in Medicaid also could indicate that the Medicaid population has less adequate access to ambulatory care. If the Medicaid population is less likely to receive ambulatory services when needed, conditions may be more likely to progress to the point where a hospital admission is required.

Likewise, if problems of patient awareness of the need for ambulatory care or compliance with prescribed treatment are more

pronounced in the Medicaid population, conditions also may be more likely in this population to progress to the point where hospitalization is required.

It is also possible that the higher observed Medicaid rate could reflect more inappropriate inpatient admissions in the Medicaid population.

From utilization data we are not able to distinguish the extent to which such processes are operating. However, these data do indicate that there are potential issues that need to be examined further.

A second point to note from Table 3.1 is that the difference in Medicaid to non-Medicaid utilization was more pronounced for medical than surgical conditions. The observed Medicaid admission rate for all nonpregnancy-related medical conditions was 5,411 per 100,000 enrollees compared to an expected rate of 2,757 per 100,000 based on non-Medicaid utilization patterns. Thus, the observed Medicaid rate for medical conditions was roughly twice what would have been expected if the Medicaid population had the same utilization as the non-Medicaid population (observed to expected ratio was 1.96). The observed Medicaid admission rate for nonpregnancy-related surgical procedures was 2,037 per 100,000, compared to an expected rate of 1,890, producing a ratio of only 1.08 for surgical conditions. Thus, the bulk of the overall Medicaid to non-Medicaid difference observed in this State was accounted for by differences in admissions for medical conditions.

Table 3.2 presents information for these summary measures for New York. The same general patterns observed in California

Table 3.2
Summary inpatient conditions:
New York, 1985-1986

Condition	Medicaid volume		Medicaid vs. non-Medicaid comparison			Geographic variation within Medicaid (SCV) c/
	Number of Medicaid cases	Percent of total Medicaid discharges	Observed Medicaid rate e/	Expected rate b,e/	Observed/ expected ratio	
Nonpregnancy-related d/:	593,577	75.5	15,234	6,658	2.29	55.2
Medical	352,676	44.9	9,052	3,570	2.54	67.9
Surgical	133,079	16.9	3,416	2,705	1.26	43.8
Psychiatric	101,541	12.9	2,606	e/	e/	577.9
Pregnancy-related	192,425	24.5	f/	f/	f/	f/

a/ The rate represents the number per 100,000 Medicaid enrollees.

b/ The expected rate is the rate expected in the Medicaid population if it had the same age and sex-specific utilization pattern as the non-Medicaid population.

c/ Systematic component of variation; based on county-to-county differences in Medicaid utilization.

d/ The total for nonpregnancy-related conditions does not equal the sum of medical, surgical, and psychiatric conditions because a small number of cases are included in the total but could not be classified.

e/ Value is not presented because of problems of missing data.

f/ Rates for pregnancy-related conditions are based on the number of deliveries, and thus are not presented for the summary measure.

NOTE: All analyses are based on the population under age 65.

also are observed in this State. Overall nonpregnancy-related utilization was notably higher in the Medicaid population. The rate observed in the Medicaid population was 15,234 admissions per 100,000 Medicaid enrollees, while the rate expected based on non-Medicaid utilization was 6,658. Thus, the observed Medicaid rate was well over twice what would have been expected if the Medicaid population had the same utilization as the non-Medicaid population (observed to expected ratio was 2.29).[21,22]

As before, the observed to expected difference was more pronounced for medical than surgical conditions. The observed Medicaid rate for medical conditions was 9,052 admissions per 100,000 enrollees compared to an expected rate of 3,570 per 100,000 based on non-Medicaid utilization (observed to expected ratio was 2.54). The observed rate for surgical conditions was 3,416 per 100,000 Medicaid enrollees compared to an expected rate of 2,705, producing an observed to expected ratio of 1.26.

While the geographic variability within the Medicaid population was roughly comparable for medical and surgical conditions, the variation in psychiatric conditions was notably higher.[23] Several interpretations are possible, for example:

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[21]Total utilization includes psychiatric conditions, which probably are more likely to be undercounted in the non-Medicaid population. This bias would cause the observed to expected difference in total utilization to be somewhat overstated (see below for further discussion).

[22]Recall that it was necessary to use fairly broad age groupings in the calculation of expected rates in this State, so the age standardization may not be complete in observed versus expected rate comparisons.

[23]Note that we cannot compare Medicaid to non-Medicaid utilization for psychiatric conditions because of problems of missing data. Discharges from hospitals categorized as psychiatric or alcohol and drug are not included in data base

there may be more physician discretion in whether to admit a person with psychiatric symptoms, and the standards applied may vary from one geographic area to another; there may be differences in the availability of alternative psychiatric services for people living in different geographic areas; individuals with psychiatric conditions may be more likely to locate in specific geographic areas; or, differences to some extent may be an artifact of the type of facilities included in the data base.[24] Again, with these data we cannot differentiate the specific reasons for the high variation, but these geographic differences in utilization within the Medicaid population suggest potential quality issues.

As shown in Table 3.3, these general patterns were repeated in Iowa. Overall nonpregnancy-related utilization was substantially higher in the Medicaid population. The observed rate was 13,149 admissions per 100,000 enrollees compared to an expected rate of 6,011 per 100,000 based on non-Medicaid utilization, producing an observed to expected ratio of 2.19.[25]

(see Section 2). The non-Medicaid population makes use of such facilities, but Medicaid generally does not cover services in these facilities for the population aged 22-64. Thus non-Medicaid utilization data is probably more likely to be missing from the data base, making Medicaid to non-Medicaid comparisons potentially biased.

[24]The data base essentially includes psychiatric discharges from general hospitals (with or without psychiatric wings). States have the option to cover services for the population under age 22 in inpatient psychiatric hospitals, and New York covered these services. Discharges from inpatient psychiatric facilities are not included in the data base.

[25]Total utilization includes psychiatric conditions, which probably are more likely to be undercounted in the non-Medicaid population. This bias would cause the observed to expected difference in total utilization to be somewhat overstated.

Table 3.3
Summary inpatient conditions:
Iowa, 1985-1987

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/ expected ratio	Geographic variation within Medicaid (%CV) c/
Nonpregnancy-related d/:	67,736	75.5	13,149	6,011	2.19	44.7
Medical	33,916	37.8	6,584	3,054	2.16	57.3
Surgical	17,210	19.2	3,341	2,101	1.59	17.8
Psychiatric	13,341	14.9	2,590	e/	e/	242.5
Pregnancy-related	21,947	24.5	f/	f/	f/	f/

a/ The rate represents the number per 100,000 Medicaid enrollees.

b/ The expected rate is the rate expected in the Medicaid population if it had the same age and sex-specific utilization pattern as the non-Medicaid population.

c/ Systematic component of variation; based on county-to-county differences in Medicaid utilization.

d/ The total for nonpregnancy-related conditions does not equal the sum of medical, surgical, and psychiatric conditions because a small number of cases are included in the total but could not be classified.

e/ Value is not presented because of problems of missing data.

f/ Rates for pregnancy-related conditions are based on the number of deliveries, and thus are not presented for the summary measure.

NOTE: All analyses are based on the population under age 65.

Though not as pronounced as in the other States, the observed to expected difference was larger for medical than surgical conditions (observed to expected ratio was 2.16 for medical conditions, and was 1.59 for surgical conditions). Again, geographic variation within the Medicaid population was notably higher for psychiatric conditions.

As noted, from data such as are available here, we cannot establish with certainty the reasons for the patterns observed. However, these data do indicate clear differences in patterns of utilization between Medicaid and non-Medicaid populations and across geographic areas.*

Next, we will explore these patterns in more detail by examining the utilization of specific treatments and procedures.

For this analysis we generated data on patterns of utilization for all 130 specific treatments and procedures. In trying to cut through this mass of information, one is faced with the question, "Where should we begin?" There are a number of approaches to address this issue, but one way is to focus on treatments and procedures that are most prominent for the Medicaid population. An examination of the distribution of admissions shows that relatively few conditions account for a large part of the total inpatient volume for this population. In this analysis we will focus on the 20 inpatient conditions with

*For the interested reader, the county-level Medicaid data for the summary conditions for each State are presented in Appendix D.

the highest Medicaid volume in each State.[17] We will divide these conditions into basic groupings that parallel the summary conditions described above: nonpregnancy-related medical conditions, nonpregnancy-related surgical conditions, psychiatric conditions, and pregnancy-related conditions.

Table 3.4 presents these data for California. The structure of the table is similar to the earlier tables. Columns (a) and (b) provide information on the volume of the conditions in the Medicaid population, where column (a) gives the overall number of Medicaid cases for each condition and column (b) gives this number as a percent of total Medicaid admissions.

Columns (c), (d), and (e) provide information on the Medicaid to non-Medicaid utilization comparison. Column (c) provides the rate observed in the Medicaid population and column (d) provides the expected rate based on non-Medicaid utilization patterns. These rates represent the number per 100,000 Medicaid enrollees, except for pregnancy-related conditions, for which the rates represent the number per 100,000 Medicaid deliveries. It is important to base rates for pregnancy-related conditions on the number of deliveries because such rates more clearly demonstrate population differences in treatment. If rates for these conditions were based on overall size of the population rather than the number of deliveries, one would not know if population differences reflected differences in

[17]Note that some of the 130 conditions included in the analysis basically represent residual categories where "other" treatments and procedures are grouped (for example, Other Nervous System Diagnoses). Such categories were too general to be useful in guiding the selection of treatments and procedures for further indepth analysis. Therefore we did not include any "other" categories in the list of top 20 volume conditions.

Table 3.4
Inpatient conditions with highest Medicaid volume:
California, 1985-1986

Condition	Medicaid volume (a) Number of Medicaid cases	Medicaid volume (b) Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison (c) Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison (d) Expected rate b,a/	Medicaid vs. non-Medicaid comparison (e) Observed/ expected ratio	Geographic variation within Medicaid (f) SCV c/	Geographic variation within Medicaid (g) Ranking of SCV d/
MEDICAL (NOT PREGNANCY-RELATED):							
Pediatric bronchitis and asthma	17,685	2.4	311	178	1.75	310.6	high
Pediatric pneumonia	14,125	1.9	248	114	2.19	156.1	medium
Pediatric gastroenteritis	13,400	1.8	236	149	1.58	281.0	high
Adult bronchitis and asthma	11,258	1.5	198	57	3.47	286.4	high
Adult gastroenteritis	11,239	1.5	198	107	1.86	114.7	medium
Seizures and headaches	10,586	1.4	186	96	1.94	71.1	low
Poisoning and toxic effects of drugs	9,797	1.3	172	82	2.10	98.7	medium
Malignancy/infection of female repro. system	8,038	1.1	141	54	2.62	292.4	high
Diabetes	7,917	1.1	139	49	2.84	72.3	low
Infectious disease, diagnosis, or procedure	7,777	1.0	137	90	1.52	114.3	medium
Nutritional and misc. metabolic disorders	7,599	1.0	134	61	2.19	75.3	low
SURGICAL (NOT PREGNANCY-RELATED):							
Hysterectomy	8,426	1.1	148	167	0.89	185.6	high
Cholecystectomy with gall bladder disease	7,675	1.0	135	73	1.86	82.0	medium
Appendectomy with appendicitis	7,664	1.0	135	113	1.19	59.9	low
PREGNANCY-RELATED:							
Vaginal delivery without complicating diagnosis	159,033	21.2	67,088	68,391	0.98	e/	e/
Caesarean section	53,363	7.1	22,511	22,937	0.98	e/	e/
Vaginal delivery with complicating diagnosis	13,282	1.8	5,603	5,423	1.03	e/	e/
Abortion (spontaneous and therapeutic)	12,008	1.6	5,066	5,161	0.98	e/	e/
Vaginal delivery with procedures	11,375	1.5	4,798	3,249	1.48	e/	e/
Threatened abortion	8,356	1.1	3,525	3,035	1.16	e/	e/
		53.3					

a/ For medical and surgical conditions, the rate represents the number per 100,000 Medicaid enrollees. For pregnancy-related conditions, the rate represents the number per 100,000 Medicaid deliveries.

b/ The expected rate is the rate expected in the Medicaid population if it had the same age and sex-specific utilization pattern as the non-Medicaid population.

c/ Systematic component of variation; based on county-to-county differences in Medicaid utilization.

d/ The ranking of a given SCV is relative to the other conditions included in the table. Low SCVs are below the 34th percentile; medium SCVs are between the 34th and 66th percentiles; high SCVs are above the 66th percentile.

e/ Because of greater restrictiveness on the possible range of variation, pregnancy-related conditions are not included in the SCV rankings.

NOTE: All analyses are based on the population under age 65. Psychiatric conditions are excluded because of problems of missing and misclassified data.

treatment or differences in the likelihood of being pregnant.[28] Column (e) gives the observed to expected ratio.

Columns (f) and (g) provide information on geographic variation in utilization within the Medicaid population. Column (f) provides the value of the Systematic Component of Variation (SCV) for each condition. As noted previously, the SCV is designed for making comparisons of the degree of variability across conditions in the same population. We used the SCV to rank the high volume conditions listed in the table in terms of their geographic variability within Medicaid. Column (g) gives the percentile ranking of each of the high volume conditions.[29] Following Roos et al. (1988), we define "low" variation conditions to be those whose SCV is below the 34th percentile, "medium" variation conditions to be those with SCVs in the 34th-66th percentiles, and "high" variation conditions to be those with SCVs above the 66th percentile. By creating these percentile groupings we can to some extent allow for the fact that the SCV is an imprecise measure of geographic variation across conditions (see Section 2), and still identify conditions with high relative variability.

Eleven medical conditions appeared on the high volume list in California: pediatric bronchitis and asthma; pediatric

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[28]Because rates for pregnancy-related conditions are based on the number of deliveries, the potential bias due to lack of uniformity in the Medicaid and non-Medicaid denominators noted in Section 2 does not apply.

[29]In this context, a percentile represents the percentage of conditions with less than a given amount of geographic variation. For example, assume that Condition X is in the 60th percentile. This indicates that 60 percent of conditions considered had less geographic variability than Condition X.

pneumonia; pediatric gastroenteritis; adult bronchitis and asthma; adult gastroenteritis; seizures and headaches; poisoning and toxic effects of drugs; malignancy or infection of the female reproductive system; diabetes; infectious disease, diagnosis or procedure; and nutritional and miscellaneous metabolic disorders. Three surgical procedures appeared on the list: hysterectomy, cholecystectomy with gall bladder disease, and appendectomy with appendicitis. Finally, six pregnancy-related conditions were included: vaginal delivery without complicating diagnosis, Caesarean section, vaginal delivery with complicating diagnosis, abortion (spontaneous and therapeutic), vaginal delivery with procedures, and threatened abortion.[30]

Together, these 20 conditions accounted for over half of all inpatient admissions in the Medicaid population of California (53.3 percent). These conditions thus represent a large part of the inpatient activity in Medicaid.

Pediatric bronchitis and asthma was the highest volume medical admission in the California Medicaid population (2.4 percent of all Medicaid admissions). The rate of inpatient admission for this condition observed in the Medicaid population was 75 percent higher than the rate expected based on non-Medicaid utilization (observed to expected ratio was 1.75),[31] and it exhibited a high degree of geographic variation within the

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[30]Recall that psychiatric conditions are not included for California because large numbers of Medicaid psychiatric discharges are likely misclassified in the data base.

[31]This result is consistent with Wissow et al. (1988), who found that the rate of admission for asthma in the Medicaid population of Maryland from 1979 to 1982 was more than twice the rate for others.

Medicaid population.

Based on this utilization data, we cannot say with certainty why these differences in patterns occurred. For example, the Medicaid to non-Medicaid difference could reflect: (1) less adequate ambulatory care in Medicaid, so children in this population are more likely to have the condition progress to the point that hospitalization is required; (2) more inappropriate admissions for this condition in the Medicaid population than in the non-Medicaid population; or (3) the condition is simply more prevalent in the Medicaid population. However, these patterns of utilization do clearly suggest the need for further indepth analysis.

Other medical conditions also are notable. Pediatric pneumonia was the second highest volume medical condition in this State, and the observed rate for this condition was over twice the rate expected based on non-Medicaid utilization (observed to expected ratio was 2.19). Pediatric and adult gastroenteritis both appear on the list, and rates observed in Medicaid were higher than rates expected based on non-Medicaid utilization patterns (observed to expected ratio was 1.58 for children and 1.86 for adults). Adult bronchitis and asthma also appears on the high volume list in this State and the difference between observed and expected rates was even more pronounced than for children (observed to expected ratio is 3.47). The observed Medicaid admission rate for malignancy or infection of the female reproductive system was over two and one-half times the expected rate based on non-Medicaid utilization (observed to expected ratio was 2.62) and exhibited a high degree of geographic

variability within Medicaid. Other medical conditions on the high volume list had higher observed than expected rates and exhibited low to medium degrees of geographic variability.

Hysterectomy was the highest volume surgical condition in the Medicaid population of this State. The rate observed in the Medicaid population for this procedure was somewhat lower than the rate expected based on non-Medicaid utilization (observed to expected ratio of 0.89). However, this procedure exhibited high variation from one geographic area to another within Medicaid. As noted previously, there are a number of interpretations for such variability, for example: Medicaid populations living in some geographic areas may have higher underlying morbidity that leads to higher rates of hysterectomy, there may be more inappropriate surgery in some geographic areas, the Medicaid population living in some areas may have less adequate access to ambulatory services so conditions are more likely to progress to the point where surgery is required, or there may be legitimate differences in physician practice patterns in different geographic areas. Such variation in utilization thus highlights the potential utility of further study.

Cholecystectomy with gall bladder disease also was high in volume, and the observed rate was higher than the expected rate (observed to expected ratio was 1.86). However, the geographic variation in this procedure within Medicaid was not as pronounced as for hysterectomy. The SCV for hysterectomy was more than

double the SCV for cholecystectomy in this State.[n]

Appendectomy with appendicitis is the last surgical condition appearing on the high volume list. The observed Medicaid rate for this procedure was roughly comparable to the rate expected in the Medicaid population if it had the same utilization pattern as the non-Medicaid population (observed to expected ratio was 1.19), and it exhibited low geographic variation within Medicaid. If a person has appendicitis, there is not a great deal of ambiguity about what should be done, so we would not expect large utilization differences for this procedure.

Pregnancy-related conditions dominate the high volume list. The six pregnancy-related conditions on the list alone accounted for over a third of all inpatient admissions (34.3 percent). Of these, the condition with the highest volume by far was vaginal delivery without complicating diagnosis (21.2 percent of all admissions). These uncomplicated deliveries accounted for about two-thirds of all Medicaid deliveries (observed rate was 67,088 per 100,000 deliveries), which is essentially the same as the rate expected based on non-Medicaid utilization patterns (observed to expected ratio was 0.98).

Deliveries by Caesarean section accounted for 7.1 percent of all Medicaid admissions, and represented almost one-fourth of all Medicaid deliveries (the observed rate of Caesarean section was 22,511 per 100,000 Medicaid deliveries). This observed rate is

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[n]Methodogical artifacts that make comparisons of SCVs imprecise are not a major problem with these two conditions (i.e., the size of the underlying rate, number of counties included in the calculation, etc., are comparable). Thus, direct comparison of the SCVs is reasonable.

comparable to what would have been expected based on the rate of Caesareans in the non-Medicaid population (observed to expected ratio was 0.98).

Other types of complicated delivery also appeared on the high volume list. The observed Medicaid rate for vaginal delivery with complicating diagnosis was 5,603 per 100,000 deliveries, which is essentially the same as expected based on the non-Medicaid rate (observed to expected ratio was 1.03). The rate for vaginal delivery with procedures was higher than the rate expected based on non-Medicaid utilization (observed to expected ratio was 1.48).

The rates observed for other nondelivery, pregnancy-related conditions on the high volume list were roughly comparable to rates expected based on non-Medicaid utilization. The observed to expected ratio for spontaneous and therapeutic abortion was 0.98, and was 1.16 for threatened abortion.[33]

The pattern should be noted for one additional pregnancy-related condition that did not appear on the high volume list. Admissions for postpartum diagnoses in part represent readmissions for complications of delivery. The rate observed in the Medicaid population was 1,873 per 100,000 deliveries, which was 40 percent higher than the rate expected based on non-Medicaid admissions for this condition (observed to expected ratio was 1.40). As with other conditions, we cannot establish

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[33]The majority of cases in the category "Spontaneous and therapeutic abortion" are spontaneous abortions. Under current Federal regulations, Federal funds can be used for therapeutic abortions only if the woman's life is in danger, but States at their own option may cover such abortions in less restrictive circumstances.

from these data that the difference represents an issue in quality of care, but it does suggest the need for further inquiry.

Table 3.5 presents data for the 20 highest volume conditions in Medicaid in New York. The high volume list in this State largely is consistent with the previous list. Fourteen of the 20 high volume conditions in California also appeared in New York (see Table 3.8). Together, the 20 conditions accounted for a little over half of all Medicaid admissions in New York (50.8 percent).

As was the case in California, pediatric bronchitis and asthma was the highest volume medical condition in the Medicaid population in this State. The observed Medicaid rate of admission was substantially higher than the rate expected based on non-Medicaid utilization (observed to expected ratio was 2.80). The pattern for adult bronchitis and asthma was even more pronounced than observed for children (observed to expected ratio was 5.45). We cannot determine from these data what factors generated these differences--for example, whether they reflect problems with access to ambulatory care or simply differences in underlying morbidity.

Utilization patterns involving other medical conditions also are notable. The rate of admission observed in the Medicaid population for malignancy or infection of the female reproductive system was well over three times the rate expected based on non-Medicaid utilization patterns (observed to expected ratio was 3.34). Observed rates for both pediatric and adult gastroenteritis were almost twice the non-Medicaid expected rates

Table 3.5
Inpatient conditions with highest Medicaid volume:
New York, 1985-1986

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/ expected ratio	Geographic variation within Medicaid: SCV c/	Geographic variation within Medicaid: Ranking of SCV d/
MEDICAL (NOT PREGNANCY-RELATED):							
Pediatric bronchitis and asthma	22,520	2.9	578	207	2.80	331.0	medium
Adult bronchitis and asthma	20,019	2.5	514	94	5.45	329.1	medium
Poisoning and toxic effects of drugs	13,516	1.7	347	91	3.81	79.2	low
Seizures and headaches	12,467	1.6	320	123	2.60	124.9	low
Malignancy/infection of female repro. system	11,791	1.5	303	91	3.34	298.9	medium
Pediatric gastroenteritis	11,563	1.5	297	155	1.92	345.7	medium
Adult gastroenteritis	10,346	1.3	266	143	1.86	359.1	high
Adult pneumonia	10,258	1.3	263	57	4.61	289.7	low
Infectious disease, diagnosis, or procedure	9,787	1.2	251	121	2.08	80.3	low
Pediatric pneumonia	9,331	1.2	239	95	2.53	372.4	high
Cellulitis	9,300	1.2	239	63	3.78	334.4	medium
Diabetes	8,650	1.1	222	63	3.55	84.4	low
Red blood cell disorders	8,248	1.0	212	53	4.02	1,511.2	high
SURGICAL (NOT PREGNANCY-RELATED):							
None in top 20 volume conditions							
PSYCHIATRIC:							
Alcohol and drug use	38,809	4.9	996	e/	e/	974.2	high
Psychosis	30,972	3.9	795	e/	e/	1,177.0	high
Alcohol/drug induced organic mental disorder	18,500	2.4	475	e/	e/	785.4	high
PREGNANCY-RELATED:							
Vaginal delivery without complicating diagnosis	81,742	10.4	65,861	66,672	0.99	f/	f/
Abortion (spontaneous and therapeutic)	35,702	4.5	28,766	20,348	1.41	f/	f/
Cesarean section	26,557	3.4	21,398	24,361	0.88	f/	f/
Vaginal delivery with complicating diagnosis	9,397	1.2	7,571	6,079	1.25	f/	f/
		50.8					

a/ For medical, surgical, and psychiatric conditions, the rate represents the number per 100,000 Medicaid enrollees. For pregnancy-related conditions, the rate represents the number per 100,000 Medicaid deliveries.

b/ The expected rate is the rate expected in the Medicaid population if it had the same age and sex-specific utilization pattern as the non-Medicaid population.

c/ Systematic component of variation; based on county-to-county differences in Medicaid utilization.

d/ The ranking of a given SCV is relative to the other conditions included in the table. Low SCVs are below the 34th percentile; medium SCVs are between the 34th and 66th percentiles; high SCVs are above the 66th percentile.

e/ The expected rate is not presented because of missing data for the non-Medicaid population.

f/ Because of greater restrictiveness on the possible range of variation, pregnancy-related conditions are not included in the SCV rankings.

NOTE: All analyses are based on the population under age 65.

(observed to expected ratio was 1.92 for children and 1.86 for adults). Medicaid rates of admission for adult and pediatric pneumonia differed substantially from expected rates (observed to expected ratio was 4.61 for adults and 2.53 for children). Red blood cell disorders exhibited high geographic variability and showed a pronounced observed to expected difference (observed to expected ratio was 4.02). The observed Medicaid rates for the remaining medical conditions were higher than the non-Medicaid expected rate, and exhibited low to moderate degrees of geographic variability.

No inpatient surgical procedures had sufficient volume to appear on the high volume list of this State. However, Table 3.6 separately presents data on the three highest volume inpatient surgeries in New York. Two of these three surgeries appeared on the high volume list in California--hysterectomy and cholecystectomy with gall bladder disease. As in California, the observed rate of hysterectomy in New York was slightly lower than the non-Medicaid expected rate (observed to expected ratio was 0.93), while the observed rate of cholecystectomy was higher than the expected rate (ratio was 1.63). Unlike California, though, these procedures exhibited similar levels of geographic variability in New York.

The three psychiatric conditions appearing on the high volume list (alcohol and drug use, psychosis, and alcohol or drug induced organic mental disorder) exhibited high geographic variation. We cannot be sure whether this variation reflects different physician practice patterns, use of alternative psychiatric services, distribution of underlying morbidity, or

Table 3.6
Inpatient surgeries with highest Medicaid volume:
New York, 1985-1986

Surgical condition	Medicaid volume		Medicaid vs. non-Medicaid comparison			Geographic variation within Medicaid (SCV) c/
	Number of Medicaid cases	Percent of total Medicaid discharges	Observed Medicaid rate a/	Expected rate b,a/	Observed/ expected ratio	
Cholecystectomy with gall bladder disease	5,464	0.7	140	86	1.63	99.2
Hystarectomy	5,264	0.7	135	145	0.93	102.8
D & C, conization excluding for malignancy	5,096	0.6	131	107	1.22	201.0

a/ The rate represents the number per 100,000 Medicaid enrollees.
b/ The expected rate is the rate expected in the Medicaid population if it had the same age and sex-specific utilization pattern as the non-Medicaid population.
c/ Systematic component of variation; based on county-to-county differences in Medicaid utilization.
NOTE: All analyses are based on the population under age 65.

other unknown factors.

Finally, the pregnancy-related conditions on this list again account for a large part of the overall inpatient volume in Medicaid; the four conditions represent almost 20 percent of all Medicaid admissions. As was the case in California, roughly two-thirds of all Medicaid deliveries were vaginal deliveries without complicating diagnosis (the observed rate was 65,861 per 100,000 deliveries), which was essentially the same as the rate expected based on non-Medicaid utilization (observed to expected ratio was 0.99).

The rate of Caesarean section in the Medicaid population was 21,398 per 100,000 deliveries, which is less than would have been expected based on non-Medicaid Caesarean rates (observed to expected ratio was 0.88). The rate for the other type of complicated delivery on the high volume list (vaginal delivery with complicating diagnosis) was somewhat higher than expected based on non-Medicaid patterns (observed to expected ratio was 1.25).

Even though it did not appear on the high volume list, the pattern of admissions for postpartum diagnoses again should be noted (recall that this in part represents readmissions for complications of delivery). The rate observed in the Medicaid population in New York was 2,764 per 100,000 deliveries, which was notably higher than the rate expected based on non-Medicaid admissions for this condition (observed to expected ratio was 1.55).

Table 3.7 presents data for the 20 highest volume conditions in Medicaid in Iowa. The high volume list in this State largely

Table 3.7
Inpatient conditions with highest Medicaid volume:
Iowa, 1985-1987

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/ expected ratio	Geographic variation within Medicaid: SCV c/	Geographic variation within Medicaid: Ranking of SCV d/
MEDICAL (NOT PREGNANCY-RELATED):							
Pediatric bronchitis and asthma	2,548	2.8	495	213	2.32	210.0	high
Pediatric pneumonia	2,152	2.4	418	177	2.36	172.0	high
Seizures and headaches	1,682	1.9	327	123	2.66	141.4	medium
Pediatric gastroenteritis	1,665	1.9	323	184	1.76	154.1	medium
Poisoning and toxic effects of drugs	1,452	1.6	282	57	4.91	90.7	medium
Adult gastroenteritis	1,417	1.6	275	137	2.01	117.9	medium
Nutritional and misc. metabolic disorders	1,261	1.4	245	90	2.72	145.0	medium
Infectious disease, diagnosis, or procedure	1,044	1.2	203	123	1.65	79.7	low
Medical back problems	1,037	1.2	201	104	1.94	74.8	low
SURGICAL (NOT PREGNANCY-RELATED):							
Tonsillectomy and/or adenoidectomy	2,689	3.0	522	372	1.40	70.8	low
Hysterectomy g/	1,809	2.0	351	209	1.68	43.1	low
Cholecystectomy with gall bladder disease	1,196	1.3	232	99	2.34	9.7	low
PSYCHIATRIC:							
Psychoses	4,794	5.3	931	e/	e/	433.5	high
Alcohol and drug use	2,187	2.4	425	e/	e/	223.8	high
Depressive neurosis	1,478	1.6	287	e/	e/	284.3	high
Alcohol and drug induced organic mental disorder	1,337	1.5	260	e/	e/	238.2	high
PREGNANCY-RELATED:							
Vaginal delivery without complicating diagnosis	11,969	13.3	67,794	72,877	0.93	f/	f/
Cesarean section	3,452	3.8	19,553	18,193	1.07	f/	f/
Vaginal delivery with procedures	1,165	1.3	6,599	3,116	2.12	f/	f/
Vaginal delivery with complicating diagnosis	1,069	1.2	6,055	5,815	1.04	f/	f/
		52.9					

a/ For medical, surgical, and psychiatric conditions, the rate represents the number per 100,000 Medicaid enrollees. For pregnancy-related conditions, the rate represents the number per 100,000 Medicaid deliveries.
b/ The expected rate is the rate expected in the Medicaid population if it had the same age and sex-specific utilization pattern as the non-Medicaid population.
c/ Systematic component of variation; based on county-to-county differences in Medicaid utilization.
d/ The ranking of a given SCV is relative to the other conditions included in the table. Low SVCs are below the 34th percentile; medium SCVs are between the 34th and 66th percentiles; high SCVs are above the 66th percentile.
e/ The expected rate is not presented because of missing data for the non-Medicaid population.
f/ Because of greater restrictiveness on the possible range of variation, pregnancy-related conditions are not included in the SCV rankings.
g/ Because of coding problems in the 1987 data, uterus and adnexa operations were pooled with hysterectomy in this State.
NOTE: All analyses are based on the population under age 65.

is consistent with the previous lists. Seventeen of the 20 high volume conditions in Iowa also appeared in one or both of the other two States (see Table 3.8). The 20 conditions on the list again accounted for over half of all Medicaid admissions (52.9 percent).

As in California and New York, pediatric bronchitis and asthma was the highest volume medical condition in Medicaid in this State, and the rate observed in the Medicaid population was substantially higher than the rate expected based on non-Medicaid utilization (observed to expected ratio was 2.32). Again, admissions for this condition exhibited high geographic variation within Medicaid.

Pediatric pneumonia was the next highest volume medical condition. The observed Medicaid rate was well over twice what would have been expected from the non-Medicaid admission rates (observed to expected ratio was 2.36).

As was the case in the other States, both pediatric and adult gastroenteritis appeared on the high volume list, with observed Medicaid rates higher than expected rates based on non-Medicaid utilization (observed to expected ratios of 1.76 and 2.01 respectively).

Two of the three surgical conditions on the high volume list in Iowa were also high volume surgeries in the other two States--hysterectomy and cholecystectomy. However, the utilization pattern for hysterectomy was different in this State. In California and New York, the observed Medicaid rate was somewhat smaller than the expected rate for this condition, but in Iowa it was larger (observed to expected ratio was 1.68). In

Table 3.8
Overlap of highest volume inpatient conditions, by State

Condition	State		
	California	New York	Iowa
MEDICAL (NOT PREGNANCY-RELATED):			
Pediatric bronchitis and asthma	x	x	x
Adult bronchitis and asthma	x	x	-
Pediatric gastroenteritis	x	x	x
Adult gastroenteritis	x	x	x
Pediatric pneumonias	x	x	x
Adult pneumonias	-	x	-
Malignancy/infection of female repro. system	x	x	-
Seizures and headaches	x	x	x
Medical back problems	-	-	x
Cellulitis	-	x	-
Diabetes	x	x	-
Nutritional and misc. metabolic disorders	x	-	x
Red blood cell disorders	-	x	-
Infectious disease, diagnosis, or procedure	x	x	x
Poisoning and toxic effects of drugs	x	x	x
SURGICAL (NOT PREGNANCY-RELATED):			
Hysterectomy	x	-	x
Cholecystectomy with gall bladder disease	x	-	x
Appendectomy with appendicitis	x	-	-
Tonsillectomy and/or adenoidectomy	-	-	x
PSYCHIATRIC:			
Depressive neurosis	a/	-	x
Psychoses	a/	x	x
Alcohol and drug use	a/	x	x
Alcohol and drug induced organic mental disorder	a/	x	x
PREGNANCY-RELATED:			
Vaginal delivery without complicating diagnosis	x	x	x
Cesarean section	x	x	x
Vaginal delivery with complicating diagnosis	x	x	x
Vaginal delivery with procedures	x	-	x
Threatened abortion	x	-	-
Abortion (spontaneous and therapeutic)	x	x	-

a/ Psychiatric conditions were not included in California because of problems misclassified data.

addition, both hysterectomy and cholecystectomy exhibited less geographic variability relative to other conditions than observed previously (surgical conditions in general exhibited low geographic variability relative to other conditions in Iowa, see Table 3.3). Of the two, hysterectomy exhibited more variation from one geographic area to another.

Four psychiatric conditions appeared on the high volume list (psychosis, alcohol and drug use, depressive neurosis, and alcohol and drug induced organic mental disorder), and as seen previously, these conditions exhibited high geographic variation within the Medicaid population.

Four pregnancy-related conditions were included on the list and accounted for a sizeable part of the total Medicaid volume (19.7 percent). Vaginal delivery without complicating diagnosis again accounted for about two-thirds of all Medicaid deliveries, which was roughly comparable to the expected rate based on non-Medicaid utilization (observed to expected ratio was 0.93). The rate of Caesarean section in Medicaid was 19,553 per 100,000 deliveries, which was about what would have been expected based on non-Medicaid Caesarean rates (observed to expected ratio was 1.07). The observed rate was about the same as expected for vaginal deliveries with complicating diagnosis, but as was seen in California, was higher for vaginal deliveries with procedures (observed to expected ratio was 2.12).

Finally, again note that the observed rate of admission for postpartum diagnoses in Medicaid was 1,461 per 100,000 deliveries, which was about one-third higher than expected based on non-Medicaid admission rates (observed to

expected ratio was 1.33).

This analysis has examined high volume conditions in Medicaid. Such an approach was useful because it helps us focus on prominent areas of Medicaid utilization. It has a limitation, though. It will tend to increase the likelihood of identifying conditions for which Medicaid utilization is higher than non-Medicaid utilization--conditions were selected because they were high in Medicaid volume. To address this issue we also explicitly want to note conditions for which Medicaid utilization was less than expected based on non-Medicaid utilization.

Table 3.9 presents the five conditions in each State with the lowest observed to expected ratios. Three conditions appeared in more than one State--tonsillectomy and/or adenoidectomy (California and New York), knee procedures (all three States), and mastectomy for malignancy (New York and Iowa). The remaining conditions were unique to each State. A number of conditions appearing on these lists were quite low in volume (for example, the expected rate for mastectomy for malignancy was 16 per 100,000 in Iowa).

Data on Medicaid volume, the Medicaid to non-Medicaid comparison, and geographic variation within Medicaid for all 130 inpatient conditions included in the study are presented in Appendix C.

In summary, several points stand out from this inpatient analysis. First, the overall observed rate of inpatient utilization in the Medicaid population was notably higher than the rate expected based on non-Medicaid utilization patterns. This difference was more pronounced for medical than surgical

Table 3.9

Inpatient conditions with lowest observed to expected ratio, by State

Condition	Medicaid volume (a) Number of Medicaid cases	Medicaid volume (b) Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison (c) Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison (d) Expected rate b,a/	Medicaid vs. non-Medicaid comparison (e) Observed/ expected ratio
CALIFORNIA, 1985-1986: c/					
Breast procedure or biopsy for nonmalignancy	445	0.1	8	23	0.34
Tonsillectomy and/or adenoidectomy	2,683	0.4	47	112	0.42
Knee procedures	1,294	0.2	23	44	0.51
Male reproductive system operations	1,246	0.2	22	37	0.60
Inguinal and femoral hernia operations	637	0.1	11	18	0.61
NEW YORK, 1985-1986:					
Knee procedures	1,259	0.2	32	74	0.44
Tonsillectomy and/or adenoidectomy	3,619	0.5	93	157	0.59
Back and neck procedures	1,271	0.2	33	45	0.73
Mastectomy for malignancy	982	0.1	25	33	0.76
Medical back problems	4,024	0.5	103	137	0.76
IOWA, 1985-1987:					
Transurethral prostatectomy	15	0.0	3	7	0.42
Knee procedures	133	0.1	26	34	0.77
Mastectomy for malignancy	72	0.1	14	16	0.85
Vaginal delivery without complicating diagnosis	11,969	13.3	67,794 d/	72,877 d/	0.93
Transurethral operations	76	0.1	15	16	0.95

a/ For medical, surgical, and psychiatric conditions, the rate represents the number per 100,000 Medicaid enrollees. For pregnancy-related conditions, the rate represents the number per 100,000 Medicaid deliveries.

b/ The expected rate is the rate expected in the Medicaid population if it had the same age and sex-specific utilization pattern as the non-Medicaid population.

c/ Psychiatric conditions are excluded for California because of problems of missing and misclassified data.

d/ Rate per 100,000 Medicaid deliveries.

NOTE: All analyses are based on the population under age 65.

conditions. The summary measure for psychiatric conditions exhibited substantially more geographic variability than medical or surgical conditions.

Second, relatively few specific conditions account for a large part of the total inpatient activity in the Medicaid population. Several of these conditions exhibit patterns that make them likely candidates for further detailed examination. Pediatric bronchitis and asthma consistently was the highest volume medical condition in the Medicaid population. The rate observed for this condition was notably higher than the rate expected based on non-Medicaid utilization, and it generally exhibited high geographic variation within the Medicaid population. Several other medical conditions also consistently were relatively high in volume and exhibited notable differences in utilization. They include: adult bronchitis and asthma, both pediatric and adult gastroenteritis, pediatric pneumonia, and malignancy or infection of the female reproductive system.

Hysterectomy and cholecystectomy consistently were among the highest volume inpatient surgeries in the Medicaid population. In two of the three sample States, hysterectomy exhibited more geographic variation than cholecystectomy.

Pregnancy-related conditions by far are the major source of inpatient admission in the population under age 65 in Medicaid. Its volume alone suggests that "delivery" care is an important area to include in any assessment of appropriateness of care in Medicaid. The higher rate of admission for postpartum conditions in Medicaid also points to the need for further inquiry in this area.

In Phase II of this project we will conduct a detailed and indepth analysis of the quality of care provided for several of the conditions highlighted above (see Section 4 for details).

3.2 Ambulatory care analysis

As noted previously, our ambulatory analysis is more limited in scope than the inpatient analysis. First, we will examine differences between geographic areas in overall ambulatory utilization within the Medicaid population. Second, we will focus on variation in utilization in particular ambulatory categories, specifically in the area of maternal and child health. In this analysis we will examine patterns of utilization of EPSDT services received by Medicaid children; in the report from the second phase of this project we will present an analysis of prenatal care in Medicaid.

Table 3.10 presents data on overall ambulatory utilization within the Medicaid population by State. In Georgia and Tennessee the rate for the county with the highest overall ambulatory utilization was almost double the rate for the county with the lowest utilization (high/low ratio was 1.91 and 1.90 respectively); in Michigan the high/low ratio was 1.79; and in California it was 1.60.[34] While it is not unusual to find larger geographic differences for specific conditions, these differences

[34]One outlier county in Georgia with an unusually low rate was excluded from the calculation. The inclusion of this county produced a high/low ratio of 5.02.

Table 3.10
Overall ambulatory utilization within Medicaid, by State

State	Number a/	Statewide rate b/	Lowest county rate b,c/	Highest county rate b,c/	High/low ratio
California, 1985-1986	25,658,079	6.02	4.86	7.79	1.60
Georgia, 1983-1984 d/	3,216,327	4.69	3.41	6.53	1.91
Michigan, 1984-1985	9,498,781	5.25	3.58	6.42	1.79
Tennessee, 1985-1986	3,228,803	6.31	4.91	9.31	1.90

a/ Number of patient days of ambulatory care (i.e., the number of days on which a given patient received at least one ambulatory service).
b/ The rates represent the number per Medicaid enrollee.
c/ County rates are age and sex-adjusted to the statewide Medicaid population by the method of indirect standardization.
d/ One outlier county in Georgia with an unusually low rate was excluded. The inclusion of this county produced a high/low ratio of 5.02.
NOTE: All analyses are based on the population under age 65.

in overall ambulatory utilization are not insignificant.[35]

Some analysts suggest that low Medicaid payment rates for physician services may depress physician participation in Medicaid and thus restrict access to care in some geographic areas (Schwartz et al., 1991). Other studies (Long et al., 1986) suggest that increasing physician fees may increase physician participation in Medicaid but not strongly affect overall ambulatory utilization--the greater availability of physicians largely would serve to shift the site of care rather than change overall utilization. From our data we cannot attribute the observed geographic differences in overall ambulatory utilization to differences in access to services; such differences, for example, could simply reflect geographic differences in underlying morbidity. In future work we will conduct a further examination of issues in physician payment, provider participation, and access to and use of ambulatory services in Medicaid (see Section 4 for further details).

Children under age 21 represent the single largest group of enrollees in Medicaid. EPSDT services are designed to provide needed preventive care for these children. Data on variation in the utilization of EPSDT services in Medicaid are described below. As noted previously, preventive care services often are not covered in private insurance plans, so we were not able to obtain comparable data for the non-Medicaid population. Thus, our analysis will focus only on utilization within the Medicaid population.

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[35]For the interested reader, data for overall ambulatory utilization for each county in the selected States is presented in Appendix E.

Table 3.11 presents data on the utilization of EPSDT services by Medicaid children in California. Overall, 564 per 1,000 Medicaid-enrolled children received at least one preventive service. This result must be interpreted carefully. The rates are based on all Medicaid-enrolled children.[36] The need for preventive screens varies by age, with young children requiring frequent contacts and older children requiring less frequent monitoring. Indeed, Yudkowsky and Fleming (1990) found that the utilization of EPSDT services in this State was higher for young children than for older children.

In keeping with the mandate guiding this interim work, the report focuses here on geographic variation in utilization.[37] The last column of Table 3.11 provides information on the degree of geographic variation in the use of specific preventive services in Medicaid, as measured by the SCV.[38] With a couple of exceptions, the screens included in this analysis were generally consistent in their small area variation. Urinanalysis and MediCal well-child visits by far exhibited the greatest degree of variation, followed by hearing screens. The degree of geographic variation was relatively comparable for the other screens, including: dental, vision, and TB screens; hemoglobin/hematocrit test; nutritional assessment; urine dipstick; checks of polio,

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[36]Also keep in mind that the analysis presented here is based on claims data. If a separate claim is not submitted for these services, utilization will be missed in the data base.

[37]The data is not sufficient to support a small-area geographic variations analysis of detailed age breakdowns, so overall rates are used.

[38]Keep in mind that only rough comparisons are possible with the SCV because the overall rates for the services are quite different in some instances (see Chapter 2 for details).

Table 3.11
Utilization of EPSDT services: California 1983-1984 a/

Type of service	Number	Observed Medicaid rate b/	Geographic variation within Medicaid (SCV) c/
Enrollees with at least one preventive visit	1,087,435	564	10.1
Vision screens	289,910	132	88.5
Hearing screens	289,433	132	153.5
Dental screens d/	1,863,538	849	28.9
TB screen	452,207	206	84.2
Hemoglobin/hematocrit test	706,176	322	66.5
Polio immunization status cheched	976,586	445	58.6
DPT immunization status checked	970,745	442	59.3
MMR immunization status checked	963,629	439	62.7
Urinanalysis	187,369	85	892.9
Urine dipstick, CHDP only	281,097	128	60.1
Nutritional assessment	969,002	441	56.6
Well-child visits, MediCal only	646,765	295	717.7
History and physical exams, CHDP only	974,710	444	55.7

a/ Includes services provided to Medicaid-enrolled children through the California Medicaid program (MediCal) and the California EPSDT program (Child Health and Disability Prevention Program, CHDP).

b/ The rates represent the number per 1,000 Medicaid-enrolled children under age 17.

c/ Systematic component of variation; based on county-to-county differences in Medicaid utilization.

d/ The number of dental screens can be larger than the number of enrollees with at least one preventive visit because a given enrollee can have multiple dental screens. Under CHDP, the physician is instructed to perform a brief dental screen for children 3 and over and refer the child to a dentist.

DPT and MMR immunization status; and CHDP history and physical exams.

SECTION 4. IMPLICATIONS AND NEXT STEPS

This interim report presents results from the first phase of a project designed to examine issues in the quality of care in Medicaid. The report presents data on patterns of utilization for inpatient conditions and selected ambulatory services. It examines whether treatments and procedures are performed more in the Medicaid population than in the non-Medicaid population, and whether these treatments and procedures are performed more in one geographic area than another within the Medicaid population. Such analysis is informative because large differences between Medicaid and non-Medicaid populations, or large amounts of variation from one geographic area to another may signal problems of appropriateness or access to care.

There are several limitations about this research which should be noted. First, the analysis is for only a few States and is based on data which are several years old, and thus may not be representative of all current Medicaid programs. Note though that the data used in this analysis were the most comprehensive and recent data of sufficient quality readily available at the time. State Medicaid programs are diverse and the selected States may not represent this range of diversity, though they do represent an important part of all Medicaid costs and utilization. Even though not strictly representative, results from this analysis can provide a useful initial indication of patterns of utilization in the Medicaid population.

Second, it is very difficult to obtain data necessary to make precisely accurate and comparable estimates for Medicaid and non-Medicaid populations. At times our methodology required that imperfect estimates be used in our calculations. Therefore numeric comparisons presented in this analysis should be viewed as approximations.

Finally, utilization analysis such as this cannot definitively establish that there are problems in the quality of care received by Medicaid patients; there may be good reasons for utilization differences observed. However, such research can help identify potential issues, and thus is a useful first step in beginning to look into the quality of care in Medicaid.

With these limitations in mind, several general points help focus the next phase of research.

- Clear differences were apparent in the patterns of utilization involving the Medicaid population. For example, the overall observed rate of inpatient utilization in the Medicaid population was substantially higher than the rate expected based on non-Medicaid utilization patterns; the difference was more pronounced for medical than surgical conditions.

- Relatively few specific conditions account for a large part of the total inpatient activity in the Medicaid population. Several of these conditions exhibit patterns that make them likely candidates for further indepth study.

    - Pediatric bronchitis and asthma consistently was the highest volume medical condition in the Medicaid population. The rate observed for this condition was notably higher than the rate expected based on non-Medicaid utilization, and it generally exhibited high geographic variation within the Medicaid population.

- oo Several other medical conditions also were relatively high in volume and exhibited notable differences in utilization, and include: adult bronchitis and asthma, both pediatric and adult gastroenteritis, pediatric pneumonia, and malignancy and infections of the female reproductive system.

- oo Hysterectomy and cholecystectomy consistently were among the highest volume inpatient surgeries in the Medicaid population, with hysterectomy exhibiting substantially more geographic variability in California and Iowa.

- oo Pregnancy-related conditions by far were the major source of inpatient admission in the population under age 65 in Medicaid. The volume alone suggests that this is an important area to include in any assessment of appropriateness of care in Medicaid. The higher rate of admission for postpartum conditions in Medicaid also points to the need for further inquiry in this area.

- o Though not as pronounced as often observed for specific procedures, the rate of overall ambulatory care utilization observed in the Medicaid population exhibited notable variation between geographic areas within some States.

We particularly have been examining results from this research to inform the indepth quality assessments planned for the second phase of this project. In Phase II we will build on the results presented here and will focus on a small number of procedures using methods that will allow a more direct and detailed assessment of the appropriateness, necessity and effectiveness of care received by the Medicaid population.

The work planned for Phase II can be divided into several parts. In the first part we plan to conduct a major medical record review to assess the quality of inpatient care received by

Medicaid patients.

In selecting conditions to include in this record review we wanted to cover certain broad areas especially relevant to the nonelderly Medicaid population; namely conditions important among children, adult females, and pregnant women. Our selection of conditions to fit these categories reflects conditions identified as likely candidates in the utilization analysis conducted for this interim report and presented above. We chose pediatric asthma as the condition for children; hysterectomy as the condition for adult females; and complicated delivery, including Caesarean section as the condition for pregnant women.

Other conditions highlighted in the Phase I analysis also would be reasonable candidates (e.g., pediatric gastroenteritis), but Phase II resource constraints restrict the choice to three conditions for the medical record review.

We are developing detailed clinical criteria to define appropriate indications, process characteristics, and outcomes of care for these three conditions. We will draw representative samples of Medicaid and non-Medicaid patients admitted for these conditions to hospitals in selected States, and will use our clinical criteria to review the medical record of each sampled patient. From this review we will assess the appropriateness of care received, and will use these data to examine and compare the quality of care provided to the Medicaid and non-Medicaid groups. This analysis will provide an indepth clinical assessment of the care received by the Medicaid population.

We plan to supplement this medical record review with an analysis of secondary data. We will use claims data for Medicaid and privately insured populations to track treatments and outcomes of care. We will compare outcomes when Medicaid recipients receive different types of treatments or different numbers of services compared to privately insured patients, and outcomes when the populations receive ostensibly the same treatments. In this analysis we currently plan to focus on the same conditions identified for the medical record review (pediatric asthma, hysterectomy, and complicated delivery), as well as the following additional conditions identified as candidate procedures from the interim utilization results presented above: adult asthma and pediatric and adult gastroenteritis.

As part of our Phase II analysis, we also plan to conduct a detailed secondary data analysis of prenatal care and pregnancy outcomes in Medicaid. The first component of this analysis will use data from the National Maternal and Infant Health Survey to examine quality issues relevant for pregnant women in Medicaid, including: characteristics of prenatal care and behavior, factors that affect access to and adequacy of prenatal care, factors that affect the quality of prenatal care, factors associated with adverse birth outcomes, and factors associated with complications of delivery and adverse delivery outcomes. The second component of this analysis will use Medicaid claims data linked to vital records from selected States to analyze the factors related to

the timing of the first prenatal care visit and adequacy of prenatal care and in turn, how these relate to birth outcomes.

As currently planned, Phase II of this effort also will include an analysis of preventable morbidity and mortality in Medicaid. This analysis will focus on a specific set of adverse health outcomes that generally are preventable with adequate and timely health care (e.g., admissions for infectious and communicable diseases). The rates for such outcomes will be compared for Medicaid and privately insured populations, and differences between the groups in prior and subsequent utilization will be examined.

We also are conducting additional research which follows up on issues highlighted by the utilization analysis presented here.

Our ambulatory analysis raised the issue of access to physician providers in Medicaid. A concern often voiced in this regard is that Medicaid physician fees are not sufficient to enlist enough provider participation to ensure adequate provision of needed services. We currently are conducting a study designed to examine issues in physician fee levels, provider participation, and access in Medicaid. This study contains a survey of the States which will obtain data on physician fees for approximately 60 procedures that are common in Medicaid, and these fees will be compared to those paid by Medicare and to prevailing private practice fees. The study also will examine patterns of physician participation in Medicaid in selected States, and will explore the impact of increases in physician

fees on access to services in Medicaid.

In summary, little prior research has focused on the appropriateness, necessity, and effectiveness of care received in Medicaid. The results generated in this interim report on patterns of utilization serve to identify potential quality issues. The second phase of this project and subsequent research will build on these results by conducting detailed and indepth examinations of issues concerning the quality of care in Medicaid.

APPENDIX A

LITERATURE REVIEW

A.1. INTRODUCTION

The advent of the Medicare and Medicaid programs represented a significant change in the delivery of health services to the nation's elderly and poor. By most accounts, these programs have been enormously successful in that they ensured access to mainstream health care for groups of people who previously had relied on a second-class system of care that was both fragmented and poorly funded. However, improving both the quantity and quality of care provided to the elderly and poor did not come without a price. In fact, the cost of the two programs escalated far beyond the expectations of the legislators who were responsible for their enactment. It is generally agreed that the Medicare and Medicaid programs contributed to the growth of the nation's health care bill that has occurred during the last two decades.

The dramatic rise in health care costs has fostered a concomitant increase in research efforts to understand the causes and consequences of this phenomenon. Early studies focused on geographic differences in medical practice patterns and health care utilization, the development of innovative health care delivery systems and reimbursement mechanisms (e.g., health maintenance organizations), and methods for monitoring utilization. Recently, in response to the introduction of the Medicare Prospective Payment System (PPS), an ambitious public and private research effort was undertaken to assess quality of

care.

Despite the relevance of these issues to the Medicaid program, this population has been largely ignored. There have been some studies examining access to care among Medicaid recipients, but these have been generally inconclusive. The quality of technical care provided to Medicaid recipients has not been examined or compared with that provided in the general population. In addition, there has been little examination of whether the Medicaid population is subject to the same wide variations in hospitalization and incidence of surgery as the Medicare and privately insured populations.

The following discussion reviews some of the salient issues concerned with assessing appropriateness and quality of care. It then turns to the Medicaid program and addresses the need to examine the appropriateness and quality of care of health care delivered to this population.

A.2. ASSESSING APPROPRIATENESS AND QUALITY OF CARE

Researchers have used a variety of approaches to assess utilization appropriateness and quality of care. In the sections that follow, we describe some of more frequently used techniques.

A.2.1 Assessment of utilization appropriateness

In evaluating the care provided to the Medicaid and non-Medicaid populations, it is important to assess the appropriateness of hospital admission, days of stay, and treatment decisions. Researchers have used several basic approaches to assess utilization appropriateness, including: the analysis of medical practice variations, the examination of treatment indications, and effectiveness research. Each of these approaches is discussed briefly below.

A.2.1.1 Analysis of medical practice variations

Numerous studies have shown significant differences in hospital utilization rates across regional and other large geographic boundaries. Regional (Detmer and Tyson, 1978) and national (Bunker, 1970) variations in surgery rates have been noted, as well as differences in all other aspects of utilization. For example, Rothberg (1982) reported great disparity in hospital utilization among four primary U.S. regions. Moreover, Chassin et al. (1986) found that approximately half of the 123 procedures studied showed at least three-fold differences between the sites with the highest rates of service and those with the lowest. Interestingly, although a number of studies have tried to identify the causes of regional

variations in utilization, the results have not been conclusive.

Another type of variations study has helped elucidate the factors contributing to differences in utilization. This is the study of "small area variations," introduced by Wennberg and Gittelsohn (1973) and subsequently explored in numerous studies (Paul-Shaheen, Clark, and Williams, 1987). This methodology examines utilization rates among ostensibly comparable populations living in neighboring localities. Population-based age- and sex-adjusted utilization rates are computed and then compared within these areas (Brewer and Freedman, 1982; Barnes, 1982).

Studies using these methods have found wide variations in the incidence of surgery (Roos, Roos, and Henteleff, 1977; Wennberg and Gittelsohn, 1973, 1975, 1982; Stockwell and Vayda, 1979; Lewis, 1969; Griffith et al., 1982) and hospital utilization (Wennberg and Gittelsohn, 1973, 1982; Wennberg, Gittelsohn and Soule, 1975; McCracken, 1980; Griffith, et al. 1982). For example, medical-surgical admission rates for children in the Aid to Families with Dependent Children (AFDC) program in Washington State ranged from 65.3 to 161.7 per 1,000 person-years, with significantly higher surgical admission rates in urban areas and higher medical admissions in rural areas (Connell, Day, and LoGerfo, 1981).

Attempts to identify demographic or health status differences that account for these differences have so far been fruitless. Instead, such variation appears to be closely tied to

the supply of health resources, notably hospital beds and physicians per capita (Bunker, 1970; Barnes, 1982; Ginsburg and Koretz, 1983; Pasley et al., 1987). Variations have also been attributed to physician medical specialties available in a community, and their procedural preferences (Wennberg and Gittelsohn, 1982; Stano, 1986; Roos et al., 1986; Stano and Folland, 1988; Roos, Wennberg and McPherson, 1988).

In sum, wide variations in utilization rates across small and large areas strongly suggest that at least a portion of hospital utilization is unnecessary. Variations studies, however, produce only empirical norms. These alone cannot provide any insight into identifying, as Wennberg (1986) put it, "which rate is right." As a result, researchers have tried to develop methods which will indicate more definitively whether utilization at the high end of the range is unnecessary, and if so, to what degree. One of these, the <u>indications</u> approach, compares the care of individual patients to a clinical rather than empirical norm of appropriateness. The other, the <u>outcome</u> approach, attempts to identify the optimum level or types of services through their impact on patient outcomes. These methods are discussed in turn below.

A.2.1.2. Identification of inappropriate utilization: The indications approach

The indications approach used to identify and quantify inappropriate utilization involves defining clinical standards

regarding the need for various treatments. Two issues largely dominate this research, the first being the necessity of acute hospitalization, and the second the necessity of various surgical procedures or other invasive treatments. However, studies of hospital length of stay and, more rarely, use of ancillary services, have also been done.

Numerous studies using a variety of criteria, have attempted to estimate the degree of inappropriate utilization. Some estimates have been quite high. In one of the earliest studies of this issue, Restuccia et al. (1984, 1986) applied a standardized criteria set known as the Appropriateness Evaluation Protocol to medical records from 25 hospitals in four professional standards review organization (PSRO) regions and 41 hospitals in three Massachusetts PSRO regions. In their initial study, 19 percent of admissions and 27 percent of days of care were classified as unnecessary. Siu et al. (1986) examined hospital utilization at the six sites participating in the randomized trial of health insurance plans conducted by the Rand Corporation. They judged 40 percent of admissions to be inappropriate.

Given the substantial decline in admissions observed over the last few years, one would expect that the rate of unnecessary admissions has also declined. However, it appears there is still a substantial amount of unnecessary hospital care. For example, although the Medicare Peer Review Organizations deny approximately 2 to 3 percent of Medicare admissions, a study

conducted by the Inspector General found 10.5 percent of Medicare admissions to be inappropriate. These findings are approximately comparable to those of the HCFA-sponsored project for the Validation of Medical Determinations by Peer Review Organizations (also known as "SuperPRO"), which has found rates of unnecessary admissions ranging from 10 to 20 percent. These results are not confined to the Medicare population. Kemper (1988), for example, found similar rates of inappropriate utilization for pediatric admissions.

Criteria-based studies of appropriateness of surgical procedures have also found that a substantial number of procedures are not indicated. For example, Greenspan et al. (1988) found that 20 percent of cardiac pacemakers were definitely not indicated, and 36 percent were equivocal. Merrick et al. (1986) found 13 percent of carotid endarterectomies to be inappropriate and 32 percent to be equivocal. Similarly, Winslow et al. (1988) found 14 percent of coronary artery bypass surgeries to be inappropriate and 30 percent to be equivocal.

These studies taken together strongly suggest that there is substantial overutilization of surgical procedures and acute medical care and that this overutilization contributes to the wide variations in procedure rates that have been observed. However, this has been difficult to establish. A recent study by Chassin et al. (1987) compared geographic variations for three procedures (coronary angiography, carotid endarterectomy, and upper GI tract endoscopy) with direct clinical assessments of

appropriateness. They found high-use sites to have a significantly higher rate of inappropriate procedures, but the difference was slight and did not begin to explain the differences in rates across sites.

Although there is a fair amount of agreement among researchers that a nontrivial portion of hospital care could be avoided, there is by no means universal acceptance of such findings within the medical profession. As Wennberg (1986) notes, much of the variability in medical decisionmaking is attributable to the fact that the relative efficacy and safety of many existing treatment decisions has not been established. In the absence of definitive data, physicians make their various choices on a largely judgmental basis (Roos, Wennberg and McPherson, 1988).

This general dearth of data on the efficacy and safety of various procedures and treatments has served as the impetus for the recent interest in the area of effectiveness research.

A.2.1.3. Effectiveness research

Effectiveness research seeks to assess appropriateness by analyzing how particular procedures affect patient outcomes. The basic model for outcome assessment is provided by the clinical trial, with its random assignment of patients to alternative treatments. There are, however, significant disadvantages of controlled clinical research. In addition to being expensive to

perform, it is generally confined to evaluation of new technologies and treatments or new applications of existing treatments. It cannot be used to assess most established treatments because it would preempt patient and physician freedom of choice. Additionally, once a therapy is widely accepted, there are ethical considerations which preclude experimentation and random assignment of patients to treatments which are thought to be less efficacious.

Once the element of random assignment is eliminated, the difficulty of interpretation increases significantly, since results may be explained not only by the intervention being tested, but by a host of other factors as well. Nevertheless, good clinical research is not confined to experimentally controlled studies, but may also be performed through statistical modeling of nonexperimental (i.e., natural) data. There is thus a large body of clinical research which, although nonexperimental, still achieves high levels of rigor through sophisticated statistical control based on epidemiological models (Blumberg, 1986).

Basically, in effectiveness research, the decision to perform a given surgical procedure or to hospitalize for a given condition becomes the treatment intervention. By comparing outcomes for patients given a treatment with those for an equivalent set of patients given an alternative treatment, one can determine the efficacy of these various treatment decisions. The method may provide physicians with heretofore unavailable

data on the benefits, or lack thereof, of many widely used treatments. To date, however, there has been very little published research linking medical practice variations and outcomes.

A.2.2. Assessment of quality of care

As the debate over appropriateness and medical practice variations continues, new cost-containment initiatives have added another level of complexity to these concerns. These initiatives, by providing incentives to reduce the quantity of care rendered, raise concerns that providers may sacrifice quality of care. As a result, there is a need to assess quality of care, in addition to studying appropriateness. Although much of the initial concern in this area focused on Medicare's DRG-based PPS, as private payers and State Medicaid programs have adopted increasingly stringent reimbursement arrangements, the concern has become more widespread.

Unfortunately, assessing quality of care is often a difficult and costly endeavor. While a variety of techniques and approaches for analyzing quality have been developed and applied over the last 20 years, many, if not most, suffer from one or more important limitations. The following are three methods that have been often used to assess quality of care: process measures, adverse occurrence or generic screening, and risk-adjusted outcomes analysis. Each of these methods is described briefly

below.

A.2.2.1. Process measures

Process measures of quality, by definition, focus on the care provided to individual patients to determine whether it meets established clinical standards. Process measures are almost necessarily disease- or condition-specific since appropriate treatment or care depends upon the patient's presenting characteristics (Dubois and Brook, 1988).

The process approach to measuring quality of care can achieve high levels of validity when the standards are developed and applied properly. The approach allows the investigator to make more detailed judgments about quality than is possible with other methods, primarily because it allows an indepth examination of the treatment decisions made throughout an entire episode of care. However, it may be difficult to quantify the clinical impact of deviations from the standards; i.e., the seriousness of actual or potential harm to the patient. Because of these inherent limitations, interest has focused in recent years on methods which are more feasible for widescale monitoring. These methods are described in the next two sections.

A.2.2.2. Adverse occurrence or generic screening

Adverse occurrence screening methods (also known as generic screening) have been developed partially in response to the need for tools that apply more widely than disease- or condition-specific process approaches. Unlike the latter methods, adverse occurrence screening can be used to evaluate all, rather than a sample of cases for a given health care institution or system. These approaches to quality assessment replace condition-specific criteria with a single "generic" set of criteria which can be applied uniformly across all diagnostic categories. This is done by shifting the focus of review. Whereas condition-specific approaches identify what actions should occur in providing care for a given condition, generic screening approaches define the adverse health events that should <u>not</u> occur in treating any and all patients (e.g., injury to organ, neurological deficit due to anesthesia). Generic screening is thus oriented to the identification of adverse occurrences; i.e., poor health outcomes, which, when they occur, have a high probability of association with substandard care.

Generic screening allows for efficient review across the whole spectrum of diseases, not just selected diagnoses. It also increases the efficiency of the review process by concentrating on the most serious quality defects; i.e., those with an actual adverse impact on patient's health. This strength is also a

major weakness. Serious deficiencies in the care rendered to a patient can have the potential for causing significant harm but may not result in actual harm to the patient being reviewed. An additional problem with the generic screening approach is that the identification of an adverse occurrence (e.g., death during or closely following elective surgery) does not necessarily signify that a quality problem actually occurred.

A.2.2.3. Risk-adjusted outcomes analysis

Outcome analysis is one of the most interesting developments in quality assessment. The application of outcome analysis to evaluate technical quality of care parallels the use of that method, described earlier, to evaluate the effectiveness of alternative treatments. Because random assignment of patients to experimental and control groups is not always feasible, outcome analysis often uses nonexperimental data and statistical techniques to control for preexisting patient characteristics (i.e., risk factors) which might affect outcomes. A prominent feature of recent research efforts is the attempt to use administrative data bases to make judgments about quality of care.

One application of this approach is the research on surgical volume and mortality. Many studies have found an inverse relationship at the hospital level between perioperative or postoperative mortality and the number of procedures performed.

All have demonstrated that, for most surgical procedures, mortality is lower for hospitals that perform more surgery, either of the specific type being studied or overall (Flood et al., 1982; Kelly and Hellinger, 1987; Luft and Hunt, 1986). More recently, there has been a great deal of interest in using mortality data to infer differences in technical quality among hospitals (Daley et al., 1988; Kahn et al., 1988). Much attention has focused on Medicare mortality data and the periodic release by HCFA of hospital-specific mortality rates.

Although interesting, most studies of outcomes are controversial, and few or none are considered conclusive. Some of the issues affecting interpretation of results are statistical (Blumberg, 1987). However, most relate to measurement concerns. Measurement problems can limit the ability to 1) characterize outcomes and 2) control for patient risk factors.

Measurement of outcome. While mortality is an important and useful measure of outcome, researchers would use more sophisticated measures of morbidity and disability if these were available in administrative data sets.

In practice, the outcome measures currently available in large data sets tend to relate to the occurrence of complications of care. Complications and many other negative health events usually result from errors of commission rather than omission. In many cases, poor quality care does not produce complications; it merely fails to prevent natural disease progression. Thus,

the identification of negative events alone is not sufficient to measure quality.

The limited number of outcome measures in these data sets has led many to consider utilization measures as a proxy for outcome. This action is based on the assumption that poor quality of care results in adverse outcomes, which in turn result in increased use of health services (Blumberg, 1986). This approach has been employed to supplement analyses of post-hospital mortality (Chassin, 1982), to assess the efficacy of various surgical procedures (Roos and Roos, 1982), and to compare outcomes among patients of family physicians and internists (Franks and Dickenson, 1986).

Despite their widespread use, problems can arise when utilization measures are used as proxies for outcomes. It has been widely established that the provision of most health services is not determined solely by a patient's clinical status, but also depends upon treatment philosophy, financial incentives, and the availability of alternate treatments. For this reason, patterns in the actual delivery of care may not accurately predict clinical outcomes.

Controlling for patient risk factors. The concept of risk has several dimensions. It encompasses the principal underlying disease, the stage of disease progression, the presence and severity of comorbid conditions unrelated to the principal disease, and the existence of nonclinical risk factors (e.g.,

age, sex, race, socioeconomic status, compliance). Most discussion in this area is related to the issue of "severity of illness," (i.e., the ability to quantify as a single variable all the factors affecting prognosis).

There are currently five systems for measuring severity in varying degrees of general use--Medical Illness Severity Groups (Brewster et al., 1985), Disease Staging (Gonnella et al., 1984; Conklin, et al., 1984), Patient Management Categories (Young, 1984), Computerized Severity Index (Horn et al., 1984), and Acute Physiological and Chronic Health Evaluation (Knaus et al., 1984). Each of these has undergone, and is continuing to undergo, extensive development and testing. In general, these systems use information about the patient's condition and treatment episode to characterize the patient's severity of illness.

The requirements of a severity system for use in risk adjusting are somewhat different from those for other applications, such as predicting resource consumption. One such requirement has been noted by Blumberg (1986). To serve its function of risk-adjusting outcome data, the severity measure must do just that; i.e., it should measure risk at the outset of the intervention and not measure other clinical events which occur in the hospital and may be the adverse result of treatment. While this is a straightforward concept, most administrative data systems do not allow for the differentiation of comorbid conditions and other factors present on admission from complications that occur after admission.

Another requirement for risk-adjusting severity systems is that they should not incorporate treatment decisions in their algorithms. It is true that for patients who are more severely ill, the intervention will often be more intense, resulting, for example, in placement in an intensive care unit or in more invasive interventions. However, given the wide variety of practice styles, such process items, as noted previously, are not unambiguous measures of either patient risk or patient outcome. While they may be appropriately used to measure case mix for reimbursement purposes, they do not have the clinical purity needed in the area of quality assessment.

Perhaps the greatest deficiencies in the various severity systems are not related to the systems themselves, but to the administrative data they are designed to use. One problem with automated data in their present form is that they are capable of reflecting only those differences in severity that can be expressed in diagnostic labeling. Thus, although promising, the validity of statistical outcome analysis will probably not improve until administrative data sets incorporate more clinically precise data. The feasibility of this undertaking is still under consideration.

A.3. APPROPRIATENESS AND QUALITY OF CARE IN THE MEDICAID POPULATION

Given the extensive research on appropriateness and quality of care in the Medicare and privately insured populations, the

lack of equivalent research in the Medicaid population is surprising. Many of the dynamics that operate in the Medicare and privately insured populations can reasonably be expected to apply to Medicaid recipients as well. Additionally, there are concerns unique to the Medicaid population. Below, after reviewing the research on the health status and utilization of health services of the Medicaid recipients, we discuss the importance of extending appropriateness and quality of care research efforts to this population.

A.3.1. Utilization of health services by Medicaid recipients

Since the inception of the Medicaid program, a number of studies have been conducted in an effort to determine whether Medicaid coverage has increased health services utilization among enrollees, and further, whether the Medicaid population receives care comparable to that of the U.S. population in general -- not only in quantity but also in quality. Many of the studies of Medicaid utilization and access are based on the data collected in 1980 as part of the National Medical Care Utilization and Expenditure Survey (NMCUES). Other studies of health care among the poor in America are based on data obtained from the National Health Interview Survey (NHIS). Another rich source of Medicaid utilization and expenditure data is HCFA's Tape-to-Tape data base, which contains Medicaid Management Information Systems (MMIS) data from four States, currently for the years 1980

through 1988.

A.3.1.1 Health status of the Medicaid population

Medicaid enrollees are by definition poor and thus may be disadvantaged nutritionally and in other ways that may affect their health. That the Medicaid population has poorer health status than middle income individuals is borne out by several studies.

Kasper and Howell (1985), analyzing 1980 NMCUES data, found that approximately 27 percent of Medicaid enrollees perceived their health as being fair or poor compared to only 11.2 percent of non-Medicaid enrollees. In addition, of those younger than 65 years of age, Medicaid enrollees consistently had the highest rates of limited activity, while the uninsured had the lowest (Howell, 1988). The differences were not dramatic, however, with all insurance coverage groups clustering between 10 and 20 restricted days per year. In contrast, the Medicaid elderly averaged more than 50 restricted activity days compared to non-Medicaid elderly with half that rate.

A closer review of the AFDC and Supplemental Security Income (SSI) populations provides a better understanding of the factors affecting the health status of the Medicaid population (note that a person becomes eligible for SSI because he/she has low income and is blind, disabled, or aged). Among SSI blind and disabled adults, two-thirds perceived their health status as fair or poor,

compared to 29.5 percent of AFDC adults under 65 years of age. Kasper and Howell (1985) also found that SSI adults had poorer health than both AFDC and non-Medicaid adults. Additionally, the restricted activity days of SSI adults (46.1) were almost double those of AFDC recipients (26.6) and more than triple those of the non-Medicaid group (12.6). Furthermore, of those persons 65 years and older, half of all Medicaid recipients perceived their health status as poor, compared with a third of non-Medicaid individuals. Once again, the Medicaid elderly had more than twice the number of average restricted activity days (57.3) than did the non-Medicaid elderly (26). Keep in mind that many persons over age 65 qualify for Medicaid after they become ill and then spend down their assets to become Medicaid eligible.

These results suggest that health status, based on perceived health status and restricted activity days, appears to be different for the Medicaid and non-Medicaid populations. The overall health status of the Medicaid population largely reflects the poorer health status of SSI adults. However, data also suggest that the AFDC population has lower health status than the nonpoor. Analyzing NMCUES data, Kasper (1986) noted that Medicaid children under 6 years of age were reportedly in poor or fair health twice as often as nonpoor children. Additionally, AFDC recipients aged 18 to 44 years of age are three times more likely to report a functional limitation than the nonpoor in the same age group.

A.3.1.2 A Comparison of Medicaid and non-Medicaid utilization

The Medicaid and non-Medicaid populations also show distinct patterns of health services utilization. As shown in Table A.1, the Medicaid population in 1980 used health services at a greater rate per person than did the non-Medicaid population. This was true for all types of services except dental visits. The largest differences in utilization were found for hospital discharges (338.9 versus 158.1 per 1000 persons), hospital days of care (2660.6 versus 1149.1 per 1000 persons) and emergency room visits (514.7 versus 251.9 per 1000 persons), where Medicaid user rates were more than twice the non-Medicaid rates (see Tables A.1 and A.2). Much of this variation can be attributed to heavier utilization by SSI enrollees who generally have poorer health and chronic health problems (O'Brien et al., 1985).

The services utilized most often by both populations were nonhospital specific services: ambulatory visits and prescription medicines, followed by physician visits. In 1980 Medicaid and non-Medicaid populations averaged 6,929.3 and 4,975 ambulatory visits, respectively, per thousand persons (see Table A.1). Table A.1 shows that similar rates existed in the use of prescription drugs and physician visits.

According to the 1980 NMCUES data shown in Table A.1, SSI enrollees consistently had more than double the inpatient hospital and surgical discharges, days of care, and average length of stay (ALOS) than AFDC enrollees. Within the

Table A.1

Utilization Rates Per 1,000 Persons, by Type of Service, Medicaid Eligibility Group, and Poverty Status: U.S. 1980.

Type of Health Care Service	Total U.S.	Medicaid Total	Medicaid AFDC	Medicaid SSI	Non-Medicaid Total	Non-Medicaid Poor	Near-Poor	Non-Poor
		Medicaid			Non-Medicaid			
		Medicaid Eligibility Group/Poverty Status						
Hospital Discharges	175.1	336.0	236.2	580.0	158.1	178.0	201.1	152.2
Hospital Days of Care	1,281.2	2,880.6	1,140.3	5,988.3	1,148.1	1,315.7	1,302.0	1,120.2
Hospital Average Length of Stay (ALOS)	7.4	7.0	4.8	10.7	7.3	7.4	6.5	7.4
Surgical Discharges	67.2	82.0	68.1	132.0	64.6	53.0	64.6	65.4
Surgical Days of Care	488.0	682.7	342.7	1,367.0	468.0	465.7	434.2	472.5
Surgical ALOS	7.3	7.3	5.0	10.4	7.3	8.7	8.7	7.2
Ambulatory Visits	5,158.7	6,828.3	4,828.3	10,828.7	4,875.0	4,437.0	4,862.7	5,028.6
Physician Visits	4,088.1	5,634.6	4,138.1	8,430.8	3,836.4	3,718.1	3,818.7	3,858.4
M.D./D.O. Visits	3,238.6	4,181.5	3,020.3	6,440.3	3,141.1	2,424.5	3,023.5	3,211.8
Outpatient Dept.	578.7	828.6	621.7	1,444.6	543.5	888.7	815.8	501.1
Emergency Room Visits	276.8	514.7	467.1	545.7	251.8	322.0	278.4	243.3
Visits to Other Medical Provider	1,062.8	1,284.5	780.2	2,488.6	1,038.6	720.8	984.1	1,072.2
Dental Visits	1,223.6	808.2	830.6	828.2	1,288.8	753.6	778.4	1,357.5
Prescribed Medicines	4,802.1	6,438.4	2,724.3	14,707.7	4,411.4	4,610.2	5,214.8	4,315.8

Sources: O'Brien et al., 1985, Vol. II, Tables 13 & 20; Rowell, 1985, Table 15, p. 67. Based on the National Medical Care Utilization and Expenditure Survey, Household Survey component.

non-Medicaid population, the nonpoor had the lowest rates of hospital discharges and days of care (152.2/1000 persons and 1,120.2/1000 persons, respectively), the highest rates of surgical discharges and days of care (65.4/1000 persons and 472.5/1000 persons, respectively) when compared to the poor and near-poor groups. With the exception of emergency room and dental visits, SSI enrollees also used ambulatory, physician, and outpatient department services as well as prescription medicines per thousand persons (10,929.7, 8,430.8, 1,444.8, and 14,707.7, respectively) at a rate more than double that of AFDC enrollees (4,929.3, 4,139.1, 621.7, and 2,724.3, respectively). SSI recipients averaged 11 ambulatory and 8 physician visits per year, compared to 5 ambulatory and 4 physician visits for AFDC women and children. The chronic health conditions of the aged, blind, and disabled SSI enrollees probably accounted for most of these differences (O'Brien, et al., 1985; O'Brien, Rodgers, and Baugh, 1985).

Distinct patterns of utilization pertaining to outpatient services were also found among non-Medicaid income groups, as shown in Table A.1. First, utilization rates of ambulatory, physician, and dental services increased as income increased. The number of ambulatory visits per thousand persons increased from 4,437 visits among the poor and 4,882.7 visits among the near-poor to 5,028.6 visits among the nonpoor. A similar gradual increase in utilization was seen for physician services. Recent research by Newacheck (1988), based on the 1982 NHIS of

40,000 households, suggests that differences in physician user rates between the Medicaid and non-Medicaid populations vary even more when adjusted for health status. Without controlling for health status, overall physician visit rates were similar for the poor and nonpoor groups. However, after adjusting for health status (through multivariate analyses), it was apparent that the poor without Medicaid coverage had significantly fewer physician visits annually (3.9/person) than the nonpoor (5.3/person). Specifically, the poor without Medicaid averaged 26 percent fewer physician contacts than the nonpoor. On the other hand, the poor with Medicaid coverage did not differ greatly from the nonpoor in the rate of annual physician visits: 5.7 and 5.3 visits, respectively. Therefore, although poverty appears to have a negative effect on utilization, Medicaid coverage seems to increase the utilization of physician services among the poor.

A.3.1.3. Utilization of health services in the AFDC population

Nearly all studies indicate that, since its enactment, Medicaid has increased health care services use for Medicaid enrollees (Leicher et al., 1985). For example, Link et al. (1982), using NHIS data, reported that increases in physician visit rates between 1969 and 1976 among all races, regions, and health status groups of nonelderly Medicaid recipients had "far outpaced" those of the general nonelderly population. They further found that black Medicaid recipients had achieved

equality with whites in Medicaid ambulatory care use.

Similarly, NMCUES data from 1980 indicate that Medicaid AFDC recipients had higher hospital discharge rates (236 vs. 158 per 1,000), although slightly fewer ambulatory care visits (4,929 vs. 4,975 per 1,000) than the non-Medicaid population (O'Brien et al., 1985; Howell, 1985). In comparing the AFDC and non-Medicaid populations, Table A.2 indicates that utilization rates among AFDC enrollees are the same or lower than those found among non-Medicaid individuals for most health services. The two exceptions are hospital discharge rates and emergency room visits. AFDC enrollees have a 50 percent higher hospital discharge rate (ratio = 1.49) than do non-Medicaid users, and they use emergency room services twice as often (ratio = 1.95).

Despite these findings, there is considerable disagreement as to whether Medicaid coverage has boosted utilization rates for enrollees to a level comparable to that of the general population, particularly with respect to primary care and routine, preventive services. Much of this discussion has focused on care provided to two significant groups: pregnant women and Medicaid children.

Prenatal care for pregnant women. A number of studies have shown that timely prenatal care is associated with positive birth outcomes (IOM, 1985). Results from obstetrical outcome studies suggest that Medicaid mothers and their infants are a group at high risk of unfavorable birth outcomes. Cooney (1985) examined

Table A.2

Ratios Between Utilization Rates for Medicaid and Non-Medicaid Groups, by Type of Service: U.S. 1980.

Type of Service	Medicaid / Non-Medicaid	SSI / AFDC	AFDC / Non-Medicaid
Hospital Discharge Rate	2.14	2.37	1.49
Hospital Days of Care Rate	2.32	5.25	.99
Hospital ALOS	1.08	2.23	.66
Surgical Discharge Rate	1.44	1.91	1.07
Surgical Days of Care Rate	1.46	3.99	.73
Surgical ALOS	1.00	2.08	.68
Ambulatory Visits	1.39	2.22	.99
Physician Visits	1.43	2.04	1.05
Outpatient Department Visits	1.71	2.32	1.14
Emergency Room Visits	2.04	1.10	1.95
Dental Visits	.64	.76	.66
Prescribed Medicines	1.46	5.40	.62

Source: O'Brien et al., 1985, Vol. I, Table C, p. 24. Based on the National Medical Care Utilization and Expenditure Survey, Household Survey component.

the effect of Medicaid coverage on timely receipt of prenatal care, using data from 1981 New York City birth certificates which contained an indication of health insurance coverage. After adjusting for differences in race, educational attainment, and marital status, Cooney found that coverage by Medicaid was associated with a delay in the start of prenatal care. Thus, Medicaid's eligibility determination process, which can result in delays between the date of application for Medicaid and the date eligibility begins, may pose an obstacle to obtaining early prenatal care (Shuptrine and Grant, 1988). Many States have implemented presumptive eligibility for pregnant women in an attempt to address this obstacle.

NMCUES data from 1980 indicate that Medicaid women had fewer prenatal care visits (4.91) than did both uninsured (5.56) and privately insured women (7.23) (Singh, Gold, and Kenney, 1987). A later study by Cooney (1985) confirmed these findings. Based on 1981 New York City birth certificate data, Cooney found that late participation or no prenatal care was associated with Medicaid coverage and an education of less than 12 years. In addition, Medicaid women obtain their prenatal care from a different set of providers than nonpoor women. Data from both NMCUES and the 1982 National Survey of Family Growth showed that clinics were used more heavily for prenatal care by Medicaid-covered and poor women in comparison to nonpoor women (Institute of Medicine, 1988).

Some studies question the association between prenatal care

and birth outcomes. Several recent studies have examined pregnancy outcomes among Hispanic women and contrasted these with outcomes for other ethnic groups (Williams et al., 1986; Remy, 1988; Shiono et al., 1986). These studies show that Hispanic women, regardless of whether they are U.S.-born or foreign-born, have higher birthweight infants on average than U.S. blacks. These findings call into question some of the previous research showing a strong association between socioeconomic status and birth outcomes. The findings also call into question the direct association between prenatal care and birth outcomes, since Hispanics are more likely than blacks to have late prenatal care.

Wagner (1988) argues forcefully that it is not the frequency of prenatal care visits, but rather other social factors and the quality of service that affect maternity outcomes. He shows as evidence the fact that European countries with widely varying average number of prenatal visits have comparable birth outcomes. In many European countries, almost all women receive early prenatal care, and yet there continue to be socioeconomic disparities within those countries in birth outcomes (Knox et al., 1980).

In short, there is evidence from previous studies both for and against the assertion that prenatal care prevents low birthweight. Harris (1982) examined this issue using a carefully constructed multivariate model. The data base was Massachusetts birth certificate data for 1975-76. He found that most differences in birthweight were explained by factors other than

prenatal care. However, prenatal care did have a significant impact on gestational age (and thus birthweight), although the effect was small.

Utilization of health services by Medicaid children. There has been considerable controversy over the adequacy of health care for Medicaid children. One major study of Medicaid children's health services utilization based on the Tape-to-Tape data is that of Rymer and Adler (1987). This study found that many enrolled children receive no Medicaid-covered health care. The percent of nonusers found in the Tape-to-Tape data (which do not include EPSDT screening services) varied from 10 percent to 30 percent, depending on eligibility group and cash assistance status.

In contrast, several studies have found equal or higher rates of use among Medicaid children in comparison to the general population. For example, Kasper (1986), using 1980 NMCUES data, found higher rates of physician services, prescriptions, and hospitalization among Medicaid recipients in poor health than among those with poor health in the general population.

Although utilization rates for Medicaid and non-Medicaid children may be approximately equal, some question whether observed utilization rates among Medicaid enrollees are adequate, given their generally poorer health status. Starfield (1982), for example, found that physician visit rates among poor children were below that of middle and upper income children when one

controls for morbidity. Newacheck (1988) and Newacheck and Starfield (1988) have similarly found lower use rates for poor children than for the nonpoor after adjusting for health status.

A.3.1.4. Evaluating appropriateness and quality of care in the Medicaid population

It remains uncertain as to whether the care provided to Medicaid recipients is (1) sufficient to meet their health care needs and (2) both appropriate and of high quality, particularly in comparison to the non-Medicaid population. Aggregate statistics on discharge rates and ambulatory visits may fail to account for potential differences in health status that exist between the Medicaid and non-Medicaid populations. Additionally, aggregate statistics may fail to reflect subtle, yet distinct, differences in the nature of the care provided to these two populations.

To begin with, the high turnover rate for Medicaid enrollment may mean that many Medicaid recipients do not have continuous coverage. This may interrupt continuity of care which, in turn, has been shown to be critical in obtaining routine preventive services. As another example, the Medicaid eligibility process may make it difficult for Medicaid women to receive adequate prenatal care in some States. Additionally, Medicaid recipients appear to receive their care from a different health network than that used by the nonpoor. Butler et al. (1985), using 1980 NMCUES data to study medical care among

children, found that poor children tend to use clinics and emergency rooms as their regular sources of care, while the nonpoor tend to use office-based physicians.

Additional data from NMCUES shows that Medicaid AFDC recipients used emergency room services at almost twice the rate of the non-Medicaid population (497 vs. 252 per 1,000), and had a higher outpatient department visit rate as well (622 vs. 544 per 1,000) (O'Brien et al., 1985). Moreover, the NMCUES data indicated that only 57.8 percent of the Medicaid population reported physicians as their regular source of care, compared with 67.7 percent of the non-Medicaid population (see Table A.3). However, substantial proportions of Medicaid enrollees reported outpatient departments, clinics, health centers (17.6 percent), and emergency rooms (3.2 percent) as regular sources of care. Non-Medicaid enrollees identified those sources of care only half as often (Howell, 1988).

Health insurance coverage and age may also affect the types of providers reported as regular sources of care. As shown in Table A.3, 56.3 percent of Medicaid enrollees younger than 65 years of age identified physicians as their regular source of care, compared to 70.5 percent of the privately insured. The uninsured were most similar to the Medicaid population in the proportion reporting physicians (55.2 percent) and emergency rooms (3.7 percent) as their regular sources of care. However, for outpatient departments reported as a regular source of care, the uninsured (9.1 percent) were more similar to the privately

Table A.3

Percent of Persons Reporting Regular Source of Care by Type of Health Insurance Coverage, U.S. 1980.

Regular Source of Care	Total Population	Medicaid	Non-Medicaid	Uninsured	Privately Insured
None	13.8	14.8	--	24.8	12.6
Physician Visits	66.8	57.8	67.7	--	--
<65 years	66.0	56.3	--	55.2	70.5
65+ years	73.1	70.4[b]	--	24.1	58.80
Hospital OPD, Clinic, Health Center	9.9	17.6	9.0	--	--
<65 years	10.1	18.7	--	9.1	7.8
65+ years	8.2	12.9[b]	--	27.2	18.5
Emergency Room	1.4	3.2	1.3	--	--
<65 years	1.5	3.4	--	3.7	.9
65+ years	.9	a	--	a	a

[a]This figure could not be determined because the standard error was more than 50 or the sample size was less than 20.

[b]This figure includes persons over 65 years of age who are covered by both Medicare and Medicaid.

Sources: Howell, 1988, Figure 2, p. 509; Leicher et al., 1985, Table 7, p. 61; O'Brien, Rodgers, and Baugh, 1985, Table U, p. 48. Based on the National Medical Care Utilization and Expenditure Survey, Household Survey component.

insured (7.8 percent) than to the Medicaid population (18.7 percent).

Insufficient Medicaid participation by obstetricians and pediatricians may be partially responsible for the absence of a regular source of care for mothers and children. Mitchell and Schurman (1984) have shown that, next to psychiatrists, obstetricians have the lowest rate of participation in Medicaid of any specialties, as measured by the percent of their patients covered by Medicaid (8.4 percent in contrast to 11.9 percent for all physicians). Pediatricians have a higher rate of participation (14.1 percent), but Davidson et al. (1983) have shown that they may still limit their practices in many ways. Davidson found a direct relationship between degree of participation in Medicaid and certain program characteristics, most importantly the level of reimbursement for services.

Thus, there is evidence of a "two-tiered" medical system in which the poor use publicly sponsored provider systems and the nonpoor use private physicians. There is no overwhelming reason to believe that the care provided in the former settings is technically inferior. However, there is evidence that it is different: Mitchell and Cromwell (1980) examined large Medicaid practices (LMPs) to determine if these practices were in fact "Medicaid mills." They found no evidence of Medicaid mills, but did note a significant "credentials gap" between providers catering to the general population and those in LMPs; the latter were older, nonboard certified, and more likely to be graduates

of foreign medical schools. As Wyszewianski and Donabedian (1981) reported, the technical quality of care provided to the disadvantaged may be equal to or better than that provided to the rest of the population, but the interpersonal aspect of quality is missing in the large clinics or hospital emergency rooms typically used by the poor.

Previous analyses of Medicaid aggregate utilization may also be relatively insensitive to differences in the provision of more technologically complex care. Roos and Roos (1982) found rates of surgery to be lower in lower income areas. Similarly, a recent study by Ford et al. (1989), which used data from the National Hospital Discharge Survey, found large racial differences in the patterns of care delivered to coronary artery disease patients. Specifically, although black men had discharge rates that were 77 percent of those found for white men, they were only half as likely to undergo coronary arteriography and a third as likely to have coronary artery bypass graft surgery performed. Similar, although somewhat smaller, differentials were observed between black and white women. It is not known whether these effects occur in the Medicaid population.

The fact that there may be substantial underutilization of some services by Medicaid recipients is not inconsistent with the possibility that there is substantial overutilization of others. Traditionally, Medicaid coverage of hospital care has been relatively generous in comparison to coverage of ambulatory services. It may be that Medicaid enrollees are more likely to

be inappropriately treated in hospital settings, rather than in ambulatory settings for certain conditions. This may be particularly true for Medicaid children. Studies have found wide variation in pediatric admission rates for both the general population (Perrin et al., 1989) and the Medicaid population (Connell et al., 1981). Thus, pediatric hospital care appears to have the same large discretionary component as that for adults.

Additionally, studies consistently find higher hospital admission rates and hospital lengths of stay for poor children than for the well-to-do (Perrin et al., 1989; Starfield, 1982; Wissow et al., 1988; Epstein et al., 1988). Admission rates can be up to twice as high for poor children and lengths of stay from 20 to 25 percent greater. The causes are unclear. Many researchers postulate that these higher admission rates reflect the greater morbidity of poor children. On the other hand, these findings may indicate only a lower threshold for admission among the poor.

There has been little clinically based examination of this phenomenon. Kemper (1988) examined the appropriateness of length of stay at a single hospital and found that 22 percent of days for Medicaid children were inappropriate. The same rate was found for privately insured children. Uninsured children had the lowest rate (14 percent) of inappropriate days.

In sum, there are a number of unresolved issues concerning the nature of care provided to Medicaid recipients, particularly vis-a-vis the non-Medicaid population. Consequently, there is a

pressing need for a comprehensive study of the appropriateness and quality of care in the Medicaid population.

APPENDIX B

INPATIENT CONDITIONS AND ASSOCIATED DIAGNOSIS RELATED GROUPS

MDC 1 DRGs 1-35
DISEASES AND DISORDERS OF THE NERVOUS SYSTEM

NERVOUS SYSTEM OPERATIONS

DRG 1	Craniotomy Age > 17 except for trauma
DRG 2	Craniotomy for trauma Age > 17
DRG 3	Craniotomy age < 18
DRG 4	Spinal Procedures
DRG 6	Carpal Tunnel Release
DRG 7	Periph & Cranial Nerve & Other Nerv Syst Procs Age > 69 and/or C.C.
DRG 8	Periph & Cranial Nerve & Other Nerv Syst Procs Age < 70 w/o C.C.

EXTRACRANIAL VASCULAR PROCEDURES

DRG 5	Extracranial Vascular Procedures

SPECIFIC CEREBROVASCULAR DISORDERS

DRG 14	Specific Cerebrovascular Disorders

TRANSIENT ISCHEMIC ATTACK AND PRECEREBRAL OCCLUSION

DRG 15	Transient Ischemic Attacks

SEIZURES AND HEADACHES

DRG 24	Seizure and Headache Age > 69 and/or C.C.
DRG 25	" " Age 18-69 w/o C.C.
DRG 26	" " Age 0-17

STUPOR AND COMA

DRG 23	Nontraumatic Stupor and Coma
DRG 27	Traumatic Stupor and Coma > 1 hour
DRG 28	" " <1hr> Age 69 and/or C.C.
DRG 29	" <1 hr. Age 18-69> w/o C.C.
DRG 30	" " <1 hr age 0-17

CONCUSSION

DRG 31	Concussion Age > 69 and/or C.C.
DRG 32	" " Age 18-69 w/o C.C.
DRG 33	" " Age 0-17

OTHER NERVOUS SYSTEM DIAGNOSES

DRG 9	Spinal Disorders and Injuries
DRG 10	Nervous System Neoplasms Age > 69 and/or C.C.
DRG 11	Nervous System Neoplasms Age < 70 w/o C.C.
DRG 12	Degenerative Nervous System Disorders
DRG 13	Multiple Sclerosis and Cerebellar Ataxia
DRG 16	Nonspecific Cerebrovascular Disorders with C.C.
DRG 17	Nonspecific Cerebrovascular Disorders w/o C.C.
DRG 18	Cranial and Peripheral Nerve Disorders > 69 and/or C.C.
DRG 19	Cranial and Peripheral Nerve Disorders < 70 w/o C.C.

OTHER NERVOUS SYSTEM DIAGNOSES, continued

DRG 20	Nervous System Infection except Viral Meningitis
DRG 21	Viral Meningitis
DRG 22	Hypertensive Encephalopathy
DRG 34	Other Disorders of the Nervous System Age > 69 and/or C.C.
DRG 35	Other Disorders of the Nervous System < 70 w/o C.C.

MDC 2 DRGs 36-48
DISEASES AND DISORDERS OF THE EYE

LENS PROCEDURES

DRG 39	Lens Procedures with or without vitrectomy

OTHER OPERATIONS ON THE EYE

DRG 36	Retinal Procedures
DRG 37	Orbital Procedures
DRG 38	Primary Iris Procedures
DRG 40	Extraocular Procedures except Orbit age > 17
DRG 41	Extraocular Procedures except Orbit age 0-17
DRG 42	Intraocular Procedures except retina, iris & lens

EYE DISORDERS

DRG 43	Hyphema
DRG 44	Acute Major Eye Infections
DRG 45	Neurological Eye Disorders
DRG 46	Other Disorders of the Eye Age > 17 with C.C.
DRG 47	Other Disorders of the Eye Age > 17 w/o C.C.
DRG 48	Other Disorders of the Eye Age 0-17

MDC 3 DRGS 49-74
DISEASES AND DISORDERS OF THE EAR, NOSE, & THROAT

TONSILLECTOMY AND/OR ADENOIDECTOMY

DRG 59	T & A age > 17
DRG 60	T & A age 0-17

OTHER EAR, NOSE AND THROAT OPERATIONS

DRG 49	Major Head & Neck Procedures
DRG 50	Sialoadenectomy
DRG 51	Salivary Gland Procedures except Sialoadenectomy
DRG 52	Cleft Lip & Palate Repair
DRG 53	Sinus & Mastoid Procedures age > 17
DRG 54	Sinus & Mastoid Procedures age 0-17
DRG 55	Misc. Ear, Nose + Throat Procedures
DRG 56	Rhinoplasty
DRG 57	T & A procedures except T & A only, age . 17
DRG 58	T & A proc " " 0-17
DRG 61	Myringotomy with tube insertion, age > 17
DRG 62	Myringotomy " " , age 0-17
DRG 63	Other Ear, Nose, Throat O.R. procedures

OTITIS MEDIA AND URI
DRG 68 Otitis Media and URI Age > 69 and/or C.C.
DRG 69 Otitis Media and URI Age 18-69 w/o C.C.

PEDIATRIC OTITIS MEDIA
DRG 70 Otitis Media and URI, age 0-17

OTHER EAR, NOSE AND THROAT DIAGNOSES
DRG 64 Ear, Nose and Throat Malignancy
DRG 65 Disequilibrium
DRG 66 Epistaxis
DRG 67 Epiglottitis
DRG 71 Laryngotracheitis
DRG 72 Nasal Trauma and Deformity
DRG 73 Other Ear, Nose and Throat Diagnoses Age > 17
DRG 74 Other Ear, " " Age 0-17

MDC 4 DRGs 75-102
DISEASES AND DISORDERS OF THE RESPIRATORY SYSTEM

RESPIRATORY SYSTEM OPERATIONS
DRG 75 Major Chest Procedures
DRG 76 O.R. Proc on the resp sys except major chest with C.C.
DRG 77 " " w/o C.C.
DRG 474 Respiratory System Diagnosis with Tracheostomy

RESPIRATORY INFECTIONS/INFLAMMATIONS
DRG 79 Respiratory Infections/Inflammations Age > 69 and/or C.C.
DRG 80 Respiratory Infections/Inflammations Age 18-69 w/o C.C.
DRG 81 Respiratory Infections/Inflammations Age 0-17

RESPIRATORY NEOPLASMS
DRG 82 Respiratory neoplasms

PULMONARY EDEMA AND RESPIRATORY FAILURE
DRG 87 Pulmonary Edema and Respiratory Failure

CHRONIC OBSTRUCTIVE PULMONARY DISEASE
DRG 88 Chronic Obstructive Pulmonary Disease

ADULT SIMPLE PNEUMONIAS
DRG 89 Simple Pneumonia and Pleurisy Age > 69 and/or C.C.
DRG 90 " " Age 18-69 w/o C.C.

PEDIATRIC PNEUMONIAS
DRG 91 Simple Pneumonia & Pleurisy Age 0-17

ADULT BRONCHITIS AND ASTHMA
DRG 96 Bronchitis & Asthma Age > 69 and/or C.C.
DRG 97 Bronchitis & Asthma Age 18-69 w/o C.C.

PEDIATRIC BRONCHITIS AND ASTHMA
DRG 98 Bronchitis & Asthma Age 0-17

RESPIRATORY SIGNS AND SYMPTOMS
DRG 99 Respiratory Signs & Symptoms Age > 69 and/or C.C.
DRG 100 Respiratory Signs & Symptoms AGe < 70 w/o C.C.

OTHER RESPIRATORY SYSTEM DIAGNOSES
DRG 78 Pulmonary Embolism
DRG 83 Major Chest Trauma AGe > 69 and/or C.C.
DRG 84 " " Age < 70 w/o C.C.
DRG 85 Pleural Effusion Age > 69 and /or C.C.
DRG 86 Pleural Effusion Age < 70 w/o C.C.
DRG 92 Interstitial Lung Disease Age > 69 and/or C.C.
DRG 93 " " Age < 70 w/o C.C.
DRG 94 Pneumothorax Age > 69 and/or C.C.
DRG 95 Pneumothorax Age < 70 w/o.C.C.
DRG 101 Other Respiratory Diagnoses Age > 69 and/or C.C.
DRG 102 " " Age < 70
DRG 475 Respiratory System Diagnosis with Ventilator Support

MDC 5 DRGs 103-145
DISEASES AND DISORDERS OF THE CIRCULATORY SYSTEM

CARDIAC VALVE PROCEDURES
DRG 104 Cardiac Valve Procedure with Pump & with Cardiac Cath
DRG 105 " w/o Cardiac Cath

CORONARY BYPASS PROCEDURES
DRG 106 Coronary Bypass with Cardiac Cath
DRG 107 " w/o Cardiac Cath

CARDIOTHORACIC PROCEDURE
DRG 108 Other Cardiovascular or Thoracic Proc., with pump
DRG 109 Cardiothoracic Procedures w/o pump

VASCULAR RECONSTRUCTIVE PROCEDURE
DRG 110 Major Reconstructive Vascular Procedures Age > 69 &/or C.C.
DRG 111 Major Reconstructive Vascular Procedures Age > 70 w/o C.C.

OTHER VASCULAR PROCEDURES

DRG 103 Heart Transplant
DRG 112 Vascular Procedures except Reconstruction w/o pump
DRG 113 Amputation for Circulatory System Disorders except Upper Limb & Toe
DRG 114 Upper Limb & Toe Amputation for Circ Sys Disorders
DRG 119 Vein Ligation & Stripping
DRG 120 Other O.R. Procedures on the Circulatory System

PACEMAKER PROCEDURES

DRG 115 Permanent Cardiac Pacemaker Implant w AMI, Heart Failure, or Shock
DRG 116 " " w/o AMI, Heart Failure or Shock
DRG 117 Cardiac Pacemaker replace & Revis exc Pulse Generator Repl only
DRG 118 Cardiac Pacemaker Pulse Generator replacement only

ACUTE MYOCARDIAL INFARCTION

DRG 121 Circulatory Disorders with AMI and C.V. comp., disch. alive
DRG 122 Circulatory Disorders with AMI w/o C.V. comp., disch. alive
DRG 123 Circulatory Disorders with AMI, expired

CIRCULATORY DISORDERS EXC. AMI, WITH CARDIAC CATH

DRG 124 Circ. Disorders exc. AMI w/Cardiac Cath and Complex Diagnoses
DRG 125 " " w/o Complex Diagnoses
DRG 126 Acute and Subacute Endocarditis

HEART FAILURE AND SHOCK

DRG 127 Heart Failure and Shock
DRG 129 Cardiac Arrest

DEEP VEIN THROMBOPHLEBITIS

DRG 128 Deep Vein Thrombophlebitis

PERIPHERAL VASCULAR DISORDERS

DRG 130 Peripheral Vascular Disorder AGe. 69 and/or C.C.
DRG 131 Peripheral Vascular Disorders Age < 70 w/o C.C.

ATHEROSCLEROSIS

DRG 132 Atherosclerosis Age > 69 and/or C.C.
DRG 133 Atherosclerosis Age < 70 w/o C.C.

HYPERTENSION

DRG 134 Hypertension

CARDIAC ARRHYTHMIAS

DRG 138 Cardiac Arrhythmia and Conduction Disorders Age > 69 and/or C.C.

DRG 139 Cardiac Arrhythmia and Conduction Disorders Age < 70 w/o C.C.

ANGINA PECTORIS

DRG 140 Angina Pectoris

SYNCOPE AND COLLAPSE

DRG 141 Syncope & Collapse Age > 69 and/or C.C.

DRG 142 Syncope & Collapse Age < 70 w/o C.C.

CHEST PAIN

DRG 143 Chest Pain

OTHER CIRCULATORY SYSTEM DIAGNOSES

DRG 135 Cardiac Congenital and Valvular Disorders Age > 69 and/or C.C.

DRG 136 Cardiac Congenital and Valvular Disorders Age 18-69 w/o C.C.

DRG 137 Cardiac Congenital & Valvular Disorders Age 0-17

DRG 144 Other Circulatory Diagnoses with C.C.

DRG 145 " w/o C.C.

MDC 6 DRGs 146-190
DISEASES AND DISORDERS OF THE DIGESTIVE SYSTEM

MAJOR SMALL AND LARGE BOWEL OPERATIONS

DRG 148 Major Small & Large Bowel Procedures Age > 69 and/or C.C.

DRG 149 Major Small & Large Bowel Procedures Age 18-69 w/o C.C.

STOMACH, ESOPHAGEAL & DUODENAL OPERATIONS

DRG 154 Stomach, Esophageal & Duodenal Procedures Age > 69 and/or C.C.

DRG 155 Stomach, Esophageal & Duodenal Procedures Age 18-69 w/o C.C.

DRG 156 Stomach, Esophageal & Duodenal Procedures Age 0-17

ANAL AND STOMAL OPERATIONS

DRG 157 Anal and Stomal Procedures Age > 69 and/or C.C.

DRG 158 Anal and Stomal Procedures < 70 w/o C.C.

INGUINAL AND FEMORAL HERNIA OPERATIONS

DRG 161 Inguinal & Femoral Hernia Procedures Age > 69 and/or C.C.

DRG 162 Inguinal & Femoral Hernia Procedures Age 18-69 w/o C.C.

PEDIATRIC HERNIA OPERATIONS
DRG 163 Hernia Procedures AGe 0-17

APPENDECTOMY WITH APPENDICITIS
DRG 164 Appendectomy w Comp Princ Diag Age > 69 and/or C.C.
DRG 165 " " Age < 70 w/o C.C.
DRG 166 " w/o Comp Princ Diag Age > 69 and/or C.C.
DRG 167 " " Age < 70 w/o C.C.

OTHER DIGESTIVE DISEASE OPERATIONS
DRG 146 Rectal Resection AGe > 69 and/or C.C.
DRG 147 " Age < 70 w/o C.C.
DRG 150 Peritoneal Adhesiolysis Age > 69 and/or C.C.
DRG 151 " Age < 79 w/o C.C.
DRG 152 Minor small & large Bowel proc Age > 69 and/or C.C.
DRG 153 " Age < 70 w/o C.C.
DRG 159 Hernia Proc exc Ing & Fem Age > 69 and/or C.C.
DRG 160 " Age 18-69 w/o C.C.
DRG 168 Proc on the mouth Age > 69 and/or C.C.
DRG 169 " Age < 70 w/o C.C.
DRG 170 Other Digestive Syst Proc.Age > 69 and/or C.C.
DRG 171 " Age < 70 w/o C.C.

DIGESTIVE MALIGNANCY
DRG 172 Digestive Malignancy Age > 69 and/or C.C.
DRG 173 Digestive Malignancy Age < 70 w/o C.C.

GASTRO-INTESTINAL HEMORRHAGE
DRG 174 G.I. Hemorrhage Age > 69 and/or C.C.
DRG 175 G.I. Hemorrhage Age < 70 w/o C.C.

PEPTIC ULCER
DRG 176 Complicated Peptic Ulcer
DRG 177 Uncomplicated Peptic Ulcer Age > 69 and/or C.C.
DRG 178 " " Age < 70 w/o C.C.

GASTRO-INTESTINAL OBSTRUCTION
DRG 180 G.I. Obstruction Age > 69 and/or C.C.
DRG 181 G.I. Obstruction Age < 70 w/o C.C.

ADULT GASTROENTERITIS
DRG 182 Esophagitis Gastroent & Misc. Digest. Dis Age > 69 and/or C.C.
DRG 183 " " Age 18-69 w/o C.C.

PEDIATRIC GASTROENTERITIS

DRG 185 Dental & Oral Dis. Excluding Extractions & Restorations Age > 17
DRG 186 Dental & Oral Dis. Excluding Extractions & Restorations Age < 17
DRG 187 Dental Extractions & Restorations

OTHER DIGESTIVE DISEASE DIAGNOSES

DRG 179 Inflammatory Bowel Disease
DRG 188 Other Digestive System Diagnoses Age > 69 and/or C.C.
DRG 189 Other Digestive System Diagnoses Age 18-69 w/o C.C.
DRG 190 Other Digestive System Diagnoses Age 0-17

MDC 7 DRGs 191-208
DISEASES & DISORDERS OF THE HEPATOBILIARY SYSTEM

CHOLECYSTECTOMY WITH GALL BLADDER DISEASE

DRG 195 Total Cholecystectomy with C.D.E. Age > 69 and/or C.C.
DRG 196 " " Age < 70 w/o C.C.
DRG 197 " without C.D.E. Age > 69 and/or C.C.
DRG 198 " Age < 70 w/o C.C.

HEPATOBILIARY SYSTEM PROCEDURES

DRG 191 Major Pancreas, Liver & Shunt Proc
DRG 192 Minor Pancreas, Liver & Shunt Proc
DRG 193 Biliary Tract Proc exc total Cholecystectomy Age > 69 and/or C.C.
DRG 194 Biliary Tract Proc edc total Cholecystectomy Age < 70 w/o C.C.
DRG 199 Hepatobiliary Diagnostic Proc for Malignancy
DRG 200 " for NonMalignancy
DRG 201 Other Hepatobiliary or Pancreas O.R. Proc

OTHER HEPATOBILIARY SYSTEM DIAGNOSES

DRG 202 Cirrhosis and Alcoholic Hepatitis
DRG 203 Malignancy of Hepatobiliary System or Pancreas
DRG 204 Disorders of the Pancreas except Malignancy
DRG 205 Disorder of the Liver exc. Malignancy, Cirrhosis & Alc. Hepatitis Age > 69 and/or C.C.
DRG 206 Disorder of the Liver exc. Malignancy, Cirrhosis & Alc. Hepatitis Age < 70 w/o C.C.
DRG 207 Disorders of the Biliary Tract Age > 69 and/or C.C.
DRG 208 Disorders of the Biliary Tract Age < 70 w/o C.C.

MDC 8 DRGs 209 - 256, 471
DISEASES & DISORDERS OF THE MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE

MAJOR JOINT OPERATIONS
DRG 209 Major Joint and Limb Reattachment Procedures
DRG 471 Bilateral or Multiple Major Joint Proc of the Lower Extreme

HIP PROCEDURE EXCEPT JOINT REPLACEMENT
DRG 210 Hip & Femur Proc exc Maj Jt Age > 69 and/or C.C.
DRG 211 " " Age 18-69 w/o C.C.
DRG 212 " " Age 0-17
DRG 230 Local Excist & Remove of int fix devices of Hip & Femur

BACK AND NECK PROCEDURES
DRG 214 Back & Neck Procedures Age > 69 and/or C.C.
DRG 215 Back & Neck Procedures Age < 70 w/o C.C.

LOWER EXTREME/HUMER PROCEDURE EXC HIP/FOOT/FEMUR
DRG 218 Low Extreme & Humer Proc.exc Hip, Foot, Femur Age > 69 &/or C.C.
DRG 219 " " Age 18-69 and/or C.C.
DRG 220 " " Age 0-17
DRG 231 Local excision & remove of int fix devices exc hip/femur

KNEE PROCEDURES
DRG 221 Knee Procedures Age > 69 and/or C.C.
DRG 222 Knee Procedures Age < 70 w/o C.C.

FOOT PROCEDURES
DRG 225 Foot Procedures

HAND PROCEDURES EXCEPT GANGLION
DRG 229 Hand or Wrist Procedures, except Major Joint Proc., w/o C.C.

OTHER MUSCULOSKELETAL SYSTEM PROCEDURES
DRG 213 Amputations for Musculoskeletal Sys & Con Tissue Donors
DRG 216 Biopsies of Musc Sys & Con Tissue
DRG 217 Wound Debrid & Skin Graft exc Hand, Mus Sys & Con Tis Dis.
DRG 223 Major Shoulder/Elbow Proc., or Oth Upper Extremity Proc., w/C.C.
DRG 224 Shoulder, Elbow, or Forearm Proc., Except Maj Joint Proc., w/o C.C.
DRG 226 Soft Tissue Procedures Age > 69 and/or C.C.
DRG 227 Soft Tissue Procedures Age < 70 w/o C.C.

OTHER MUSCULOSKELETAL SYSTEM PROCEDURES, continued

DRG 228 Major Thumb or Joint Proc., or Oth. Hand or Wrist Proc., w/C.C.
DRG 232 Arthroscopy
DRG 233 Other musculo.sys & con tis O.R. proc Age > 69 and/or C.C.
DRG 234 " Age < 70 w/o C.C.

FRACTURE FEMUR/HIP/OR PELVIS

DRG 235 Fractures of the Femur
DRG 236 Fractures of the Hip and Pelvis
DRG 237 Sprains/Strains/Dislocations of the Hip, Pelvis and Thigh

PATH FRACTURES & CONNECTIVE TISSUE MALIGNANCY

DRG 239 Path Fractures and Musculoskeletal and Con Tissue Malignancy

MEDICAL BACK PROBLEMS

DRG 243 Medical Back Problems

OTHER MUSCULOSKELETAL SYSTEM DIAGNOSES

DRG 238 Osteomyelitis
DRG 240 Connective Tissue Disorders Age > 69 and/or C.C.
DRG 241 Connective Tissue Disorders Age < 70 w/o C.C.
DRG 242 Septic Arthritis
DRG 244 Bone Disease and Septic Arthropathy Age > 69 and/or C.C.
DRG 245 " " Age < 70 w/o C.C.
DRG 246 Nonspecific Arthropathies
DRG 247 Signs and Symptoms of Musculoskeletal System and Conn. Tissue

OTHER FRACTURES/SPRAINS/DISLOCATIONS

DRG 250 Fx, Sprns & Disl. of Forearm/Hand/Foot Age > 69 and/or C.C.
DRG 251 Fx, Sprns & Disl. of " " Age 18-69 w/o C.C.
DRG 252 Fx, Sprns & Disl. of " " Age 0-17
DRG 253 Fx, Sprns & Disl. of Uparm/Low Leg exc. Foot Age > 69 and/or C.C.
DRG 254 Fx, Sprns & Disl. of " " Age 18-69 w/o C.C.
DRG 255 Fx, Sprns & Disl. of " " Age 0-17

MDC 9 DRGs 257 - 284
DISEASES & DISORDERS OF THE SKIN, SUBCUTANEOUS TISSUE AND BREAST

MASTECTOMY FOR MALIGNANCY

DRG 257 Total Mastectomy for Malignancy Age > 69 and/or C.C.
DRG 258 " " Age < 70 w/o C.C.
DRG 259 Subtotal Mastectomy for Malig Age > 69 and/or C.C.
DRG 260 " " Age < 70 w/o C.C.

BREAST PROCEDURE/BIOPSY FOR NONMALIGNANCY

DRG 261 Breast Proc for Nonmalig exc Biopsy & Loc Exc
DRG 262 Breast Biopsy & Local Excis for Nonmalignancy

SKIN GRAFTS

DRG 263 Skin Grafts and/or Debrid Ulcer or Cellulitis Age > 69 and/or C.C.
DRG 264 " Age < 70 w/o C.C.
DRG 265 Skin Grafts and/or Debrid exc Ulcer/Cellulitis with C.C.
DRG 266 " w/o C.C.

OTHER SKIN, SUBCUTANEOUS TISSUE, & BREAST PROCEDURES

DRG 267 Perianal and Pilonidal Procedures
DRG 268 Skin, Subcutaneous Tis & Breast Plastic Proc
DRG 269 Other skin, subcut Tis/Breast O.R. Proc Age > 69 and/or C.C.
DRG 270 " " Age < 70 w/o C.C.

OTHER SKIN, SUBCUTANEOUS TISSUE AND BREAST DISORDERS

DRG 271 Skin Ulcers
DRG 272 Major Skin Disorders Age > 69 and/or C.C.
DRG 273 " Age < 79 w/o C.C.
DRG 274 Malignant Breast Disorders AGe > 69 and/or C.C.
DRG 275 " AGe < 70 w/o C.C.
DRG 276 Nonmalignant Breast Disorders
DRG 280 Trauma to Skin/Subcut. Tissue and Breast Age > 69 and/or C.C.
DRG 281 Trauma to Skin/Subcut. Tissue and Breast Age 0-17
DRG 283 Minor Skin Disorders Age > 69 and/or C.C.
DRG 284 " AGe < 70 w/o C.C.

CELLULITIS

DRG 277 Cellulitis AGe > 69 and/or C.C.
DRG 278 " Age 18-69
DRG 279 " Age 0-17

MDC 10 DRGs 285-301
ENDOCRINE, NUTRITIONAL, AND METABOLIC DISEASES & DISORDERS

ENDOCRINE, NUTRITIONAL & METABOLIC OPERATIONS
DRG 285 Amputations for Endocrine, Nutri, & Metab Disorders
DRG 286 Adrenal & Pituitary Procedures
DRG 287 Skin Grafts & Wound Debride for E/N/M Disorders
DRG 288 O.R. Procedures for Obesity
DRG 289 Parathyroid Procedures
DRG 290 Thyroid Procedures
DRG 291 Thyroglossal Procedures
DRG 292 Other E/N/MOR Proc Age > 69 and/or C.C.
DRG 293 " Age < 70 w/o C.C.

DIABETES
DRG 294 Diabetes Age > = 36
DRG 295 Diabetes Age 0-35

NUTRITIONAL AND MISC. METABOLIC DISORDERS
DRG 296 Nutritional and Misc. Metabolic Disorders Age > 69 and/or C.C.
DRG 297 Nutritional and Misc. Metabolic Disorders Age 18-69 w/o C.C.
DRG 298 Nutritional & Misc. Metabolic Disorders Age 0-17

OTHER ENDOCRINE, NUTRITIONAL AND METABOLIC DIAGNOSES
DRG 299 Inborn Errors of Metabolism
DRG 300 Endocrine Disorders Age > 69 and/or C.C.
DRG 301 " Age < 70 w/o C.C.

MDC 11 DRGs 302-333
DISEASES AND DISORDERS OF THE KIDNEY & URINARY TRACT

MAJOR GENITO-URINARY TRACT OPERATIONS
DRG 302 Kidney Transplant
DRG 303 Kidney, Ureter & Major Bladder Proc for Neoplasm
DRG 304 Kidney, Ureter & Major Bladder Proc for Nonmalig Age > 69 and/or C.C.
DRG 305 Kidney, Ureter & Major Bladder Proc for Age < 70 w/o C.C.

PROSTATECTOMY
DRG 306 Prostatectomy Age > 69 and/or C.C.
DRG 307 " Age < 70 w/o C.C.

MINOR GENITO-URINARY TRACT OPERATIONS

DRG 308 Minor Bladder Proc Age > 69 and/or C.C.
DRG 309 " Age < 70 w/o C.C.
DRG 312 Urethral Procedures Age > 69 w/o C.C.
DRG 313 " " Age 18-69 w/o C.C.
DRG 314 " " Age 0-17
DRG 315 Other Kidney & Urinary Tract O.R. Procedures

TRANSURETHRAL OPERATIONS

DRG 310 Transurethral Procedures Age > 69 and/or C.C.
DRG 311 Transurethral Procedures Age < 70 w/o C.C.

RENAL FAILURE AND DIALYSIS

DRG 316 Renal Failure w/o Dialysis
DRG 317 Renal Failure w/Dialysis

KIDNEY AND URINARY TRACT INFECTIONS

DRG 320 Kidney & Urinary Tract Infections Age > 69 and/or C.C.
DRG 321 Kidney & Urinary Tract Infections Age < 70 w/o C.C.
DRG 322 Kidney & Urinary Tract Infections Age 0-17

URINARY TRACT STONES

DRG 323 Urinary Stones Age > 69 and/or C.C.
DRG 324 Urinary Stones Age < 70 w/o C.C.

KIDNEY AND URINARY TRACT DIAGNOSES

DRG 318 Kidney and Urinary Tract Neoplasms Age > 69 and/or C.C.
DRG 319 Kidney and Urinary Tract Neoplasms Age < 70 w/o C.C.
DRG 325 Kidney and Urinary Tract Signs & Symptoms Age > 69 and/or C.C.
DRG 326 Kidney and Urinary Tract Signs & Symptoms Age 18-69 w/o C.C.
DRG 327 Kidney and Urinary Tract Signs & Symptoms Age 0-17
DRG 328 Urethral Stricture Age > 69 and/or C.C.
DRG 329 Urethral Stricture Age 18-69 w/o C.C.
DRG 330 Urethral Stricture Age 0-17
DRG 331 Other Kidney and Urinary Tract Diagnoses Age > 69 and/or C.C.
DRG 332 Other Kidney and Urinary Tract Diagnoses Age 18-69 w/o C.C.
DRG 333 Other Kidney and Urinary Tract Diagnoses Age 0-17

MDC 12 DRGs 334-352
DISEASES AND DISORDERS OF THE MALE REPRODUCTIVE SYSTEM

MAJOR MALE PELVIC PROCEDURES

DRG 334 Major Male Pelvic Procedures with C.C.
DRG 335 " " Age < 70 w/o C.C.

TRANSURETHRAL PROSTATECTOMY

DRG 336 Transurethral Prostatectomy AGe > 69 and/or C.C.
DRG 337 " " AGe < 70 w/o C.C.

MALE REPRODUCTIVE SYSTEM OPERATIONS

DRG 338 Testes Procedures, for Malignancy
DRG 339 " for Nonmalignant Age > 17
DRG 340 " " Age 0-17
DRG 341 Penis Procedures
DRG 342 Circumcision Age > 17
DRG 343 Circumcision Age 0-17
DRG 344 Other Male Reproductive Sys O.R. Proc for Malignancy
DRG 345 Other Male Repro Sys O.R. Proc except for Malignancy
DRG 351 Sterilization, Male

MALE REPRODUCTIVE SYSTEM DIAGNOSES

DRG 346 Malignancy, Male Reproductive System Age > 69 and/or C.C.
DRG 347 Malignancy, Male Reproductive System Age < 70 w/o C.C.
DRG 348 Benign Prostatic Hypertrophy Age > 69 and/or C.C.
DRG 349 " Age < 70 w/o C.C.
DRG 350 Inflammation of the Male Reproductive System
DRG 352 Other Male Reproductive System Diagnoses

MDC 13 DRGs 353-369
DISEASES AND DISORDERS OF THE FEMALE REPRODUCTIVE SYSTEM

HYSTERECTOMY

DRG 354 Nonradical hysterectomy age > 69 and/or C.C.
DRG 355 Nonradical hysterectomy age < 70 w/o C.C.

UTERUS AND ADNEXA OPERATIONS

DRG 357 Uterus and Adnexa procedures, for malignancy
DRG 358 Uterus and Adnexa proc. for Nonmalig. exc. tubal interrupt

FEMALE REPRODUCTIVE SYSTEM OPERATIONS

DRG 356 Female Repro Sys Reconstructive Procedures
DRG 360 Vagina, Cervix & Vulva Procedures
DRG 363 D&C, Conization & Radio-Implant, for Malignancy
DRG 365 Other Female Repro Sys O.R. Procedures

TUBAL INTERRUPTIONS FOR NonMALIGNANCY

DRG 361 Laparoscopy plus incisional tubal interruption
DRG 362 Endoscopic Tubal Interruption

D & C, CONIZATION EXC FOR MALIGNANCY

DRG 364 D & C Conization Exc for Malignancy

MALIGNANCY AND INFECTIONS, FEMALE REPRODUCTIVE SYSTEM

DRG 366 Malignancy, Female Reproductive System Age > 69 and/or C.C.
DRG 367 Malignancy, Female Reproductive System Age < 70 w/o C.C.
DRG 368 Infections, Female Reproductive System
DRG 369 Menstrual and Other Female Reproductive System Disorders

MDC 14
MATERNITY-RELATED modified DRGS

CESAREAN SECTION
DRG 370 Cesarean Section with C.C.
DRG 371 Cesarean Section w/o C.C.

VAGINAL DELIVERY WITH COMPLICATING DIAGNOSIS
DRG 372 Vaginal Delivery w. Complicating Diagnosis

VAGINAL DELIVERY WITHOUT COMPLICATIONS
DRG 373 Vaginal Delivery w/o Complicating Diagnosis

VAGINAL DELIVERY WITH PROCEDURE
DRG 374 Vaginal Delivery w Sterilization and/or D & C
DRG 375 Vaginal Delivery w O.R procedure exc. Steril &/or D & C

POSTPARTUM PROCEDURES/DIAGNOSES
DRG 376 Postpartum Diagnoses w/o O.R. Procedure
DRG 377 Postpartum Diagnoses with O.R. Procedure

ECTOPIC PREGNANCY
DRG 378 Ectopic Pregnancy

THREATENED ABORTION
DRG 379 Threatened Abortion

ABORTION
DRG 380 Abortion w/o D & C
DRG 381 Abortion with D & C

FALSE LABOR
DRG 382 False Labor

OTHER ANTEPARTUM DIAGNOSES
DRG 383 Other Antepartum Diagnoses w. Medical Complic.
DRG 384 Other Antepartum Diagnoses w/o Medical Complic.

MDC 16 DRGs 392-399
DISEASES AND DISORDERS OF BLOOD AND BLOOD FORMING ORGANS AND IMMUNOLOGICAL DISORDERS

RED BLOOD CELL DISORDERS
DRG 395 Red Blood Cell Disorders Age > 17
DRG 396 Red Blood Cell Disorders Age 0-17

OTHER BLOOD DISORDERS/PROCEDURES
DRG 392 Splenectomy > 17
DRG 393 Splenectomy 0-17
DRG 394 Other O.R. Proc of the Blood & Blood Forming Organs
DRG 397 Coagulation Disorders
DRG 398 Reticuloendothelial and Immunity Disorders Age > 69 and/or C.C.
DRG 399 Reticuloendothelial and Immunity Disorders Age < 70 w/o C.C.

MDC 17 DRGs 400-414, 473
MYELOPROLIFERATIVE DISEASES AND DISORDERS, AND POORLY DIFFERENTIATED NEOPLASMS

MYELOPROLIF DISEASES AND DISORDERS WITH PROCEDURE
DRG 400 Lymphoma or Leukemia with Major O.R. Proc
DRG 401 Lymphoma or NonAcute Leukemia w/oth O.R. Proc. w/C.C.
DRG 402 Lymphoma or NonAcute Leukemia w/oth O.R. Proc. w/o C.C.
DRG 406 Myeloprolif Disorder or Poorly Diff Neoplasm w/Major O.R. Proc w/C.C.
DRG 407 Myeloprolif Disorder or Poorly Diff Neoplasm w/o Major or Proc > 69 w/o C.C.
DRG 408 Myeloprolif Disorder or Poorly Diff Neoplasm with Minor O.R. Proc < 70 w/o C.C.

MYELOPROLIFERATIVE DISORDER DIAGNOSES
DRG 403 Lymphoma or NonAcute Leukemia with C.C.
DRG 404 " w/o C.C.
DRG 405 Acute Leukemia without major O.R. Proc.
DRG 411 History of Malignancy w/o Endoscopy
DRG 412 " with Endoscopy
DRG 413 Other Myeloproliferative Disorders or Poorly Diff. Neopl. Diagnoses Age > 69 and/or C.C.
DRG 414 Other Myeloproliferative Disorders or Poorly Diff. Neopl. Diagnoses Age < 70 w/o C.C.
DRG 473 Acute Leukemia w/o major O.R. Procedure Age > 17

CHEMOTHERAPY/RADIOTHERAPY
DRG 409 Radiotherapy
DRG 410 Chemotherapy

MDC 18 DRGs 415-423
INFECTIONS AND PARASITIC DISEASES (SYSTEMIC OR UNSPECIFIED SITES)

SEPTICEMIA
DRG 416 Septicemia Age > 17
DRG 417 Septicemia Age 0-17

INFECTIOUS DISEASE DIAGNOSES/PROC.
DRG 415 O.R. Proc for Infectious & Parasitic Diseases
DRG 418 Postoperative and Post-traumatic Infections
DRG 419 Fever Unknown Origin Age > 69 and/or C.C.
DRG 420 " Age 18-69 w/o C.C.
DRG 421 Viral Illness Age > 17
DRG 422 Viral Illness + Fever of unknown origin Age 0-17
DRG 423 Other Infectious and Parasitic Diseases Diagnoses

MDC 19 DRGs 424-432
MENTAL DISEASES AND DISORDERS

ACUTE ADJUSTMENT REACTION
DRG 425 Acute Adjustment Reaction and Disturbance of Psychosocial Dysfunction

DEPRESSIVE NEUROSIS
DRG 426 Depressive Neurosis

PSYCHOSIS
DRG 430 Psychoses

OTHER MENTAL DISORDERS/PROC.
DRG 424 O.R. Proc with Principal Dx Mental Illness
DRG 427 Neuroses except Depressive
DRG 428 Disorders of Personality and Impulse Control
DRG 429 Organic Disturbance and Mental Retardation
DRG 431 Childhood Mental Disorders
DRG 432 Other Diagnoses of Mental Disorders

MDC 20 DRGs 433-438
SUBSTANCE USE AND SUBSTANCE INDUCED ORGANIC MENTAL DISORDERS

ALCOHOL & DRUG-INDUCED ORGANIC MENTAL DISORDERS
DRG 433 Substance Use & Substance Induced Mental Disorders...
DRG 438 Alcohol & Substance Induced Organic Mental Syndrome

ALCOHOL & DRUG USE
DRG 434 Drug Dependence
DRG 435 Drug Use except Dependence
DRG 436 Alcohol Dependence
DRG 437 Alcohol Use except Dependence

MDC 21 DRGs 439-455
INJURIES, POISONINGS AND TOXIC EFFECT OF DRUGS

OPERATIONS FOR INJURIES
DRG 439 Skin grafts for injuries
DRG 440 Wound Debridements for injuries
DRG 441 Hand Procedures for injuries
DRG 442 Other O.R. procedures for injuries Age > 69 and/or C.C.
DRG 443 " Age < = 70 w/o C.C.

POISONING & TOXIC EFFECTS OF DRUGS
DRG 449 Poisoning & Toxic Effects of Drugs Age > 69 and/or C.C.
DRG 450 " " Age 18-69 w/o C.C.
DRG 451 " " Age 0-17

COMPLICATIONS OF TREATMENT
DRG 452 Complications of Treatment Age > 69 and/or C.C.
DRG 453 " Age < 70 w/o C.C.

OTHER INJURIES, POISONINGS, TOXIC EFFECTS DIAGNOSES
DRG 444 Multiple Trauma Age > 69 and/or C.C.
DRG 445 " Age 18-69 w/o C.C.
DRG 446 " Age 0-17
DRG 447 Allergic Reactions Age > 17
DRG 448 Allergic Reactions Age 0-17
DRG 454 Other Injuries, Poisonings and Toxic Effect Diagnoses Age > 69 and/or C.C.
DRG 455 Other Injuries, Poisonings and Toxic Effect Diagnoses Age < 70 w/o C.C.

MDC 22 DRGs 456-460, 472
BURNS

BURNS TREATMENT
DRG 456 Burns, Transferred to another Acute Care Facility
DRG 457 Extensive Burns
DRG 458 Nonextensive Burns with Skin Grafts
DRG 459 Nonextensive Burns with Wound Debridement and Other O.R. Proc
DRG 460 Nonextensive Burns with Wound Debridement w/o O.R. Proc
DRG 472 Extensive Burns with O.R. Proc.

MDC 23 DRGs 461-467
FACTORS INFLUENCING HEALTH STATUS AND OTHER CONTRACTS WITH HEALTH SERVICES

OTHER FACTORS INFLUENCING HEALTH STATUS

DRG 461	O.R. Proc with Dx of other Contact with Health Services
DRG 462	Rehabilitation
DRG 463	Signs and Symptoms with C.C.
DRG 464	" w/o C.C.
DRG 465	Aftercare with History of Malignancy as Secondary Diagnosis
DRG 466	Aftercare w/o History of Malignancy as Secondary Diagnosis
DRG 467	Other Factors Influencing Health Status

NOT CLASSIFIED

DRG 468	Unrelated O.R. Procedure
DRG 469	Invalid Principal Diagnosis
DRG 470	Ungroupable
DRG 476	Prostatic O.R. Procedure Unrelated to Principal Diagnosis
DRG 477	Nonextensive O.R. Procedure Unrelated to Principal Diagnosis

APPENDIX C

TABLES FOR ALL INPATIENT CONDITIONS

Table C.1
All inpatient conditions: California, 1985-1986

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
SUMMARY CONDITIONS:							
Nonpregnancy related e/	463,925	61.8	8,162	4,959	1.65	57	47.3
Medical	307,594	41.0	5,411	2,757	1.96	57	58.8
Surgical	115,761	15.4	2,037	1,890	1.08	56	75.5
Psychiatric	33,996	4.5	f/	f/	f/	f/	f/
Pregnancy-related	286,595	38.2	g/	g/	g/	g/	g/
MDC 1 - DISEASES AND DISORDERS OF THE NERVOUS SYSTEM:							
Extracranial vascular procedures	369	0.0	6	5	1.25	10	371.5
Nervous system operations	4,859	0.6	85	59	1.46	41	76.8
Specific cerebrovascular disorders	2,862	0.4	50	20	2.53	33	48.0
Transient ischemic attack and precerebral occlusion	916	0.1	16	9	1.88	16	128.6
Seizures and headaches	10,586	1.4	186	96	1.94	47	71.1
Stupor and coma	4,097	0.5	72	48	1.51	39	75.0
Concussion	2,445	0.3	43	45	0.96	30	246.0
Other nervous system diagnoses	8,817	1.2	155	88	1.76	45	72.5
MDC 2 - DISEASES AND DISORDERS OF THE EYE:							
Lens operations	274	0.0	5	4	1.31	6	788.6
Other eye operations	2,365	0.3	42	30	1.37	30	163.2
Eye disorders	2,004	0.3	35	24	1.47	26	121.5
MDC 3 - DISEASES AND DISORDERS OF THE EAR, NOSE, AND THROAT:							
Tonsillectomy and/or adenoidectomy	2,683	0.4	47	112	0.42	32	1,000.0
Other ear, nose, and throat operations	6,470	0.9	114	144	0.79	42	130.5
Adult otitis media and URI	1,135	0.2	20	12	1.73	20	81.4
Pediatric otitis media	4,265	0.6	75	50	1.50	35	119.7
Other ear, nose, and throat diagnoses	3,980	0.5	70	60	1.17	36	37.5
MDC 4 - DISEASES AND DISORDERS OF THE RESPIRATORY SYSTEM:							
Respiratory system operations	1,639	0.2	29	18	1.57	26	151.9
Respiratory infections and inflammations	3,373	0.4	59	16	3.65	36	246.0
Respiratory neoplasms	2,229	0.3	39	13	3.09	29	256.7

Table C.1, continued
All inpatient conditions: California, 1985-1986

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 4 - continued:							
Pulmonary edema and respiratory failure	1,728	0.2	30	9	3.51	26	53.0
Chronic obstructive pulmonary disease	3,893	0.5	68	15	4.60	37	149.2
Adult pneumonia	6,094	0.8	107	35	3.10	41	60.2
Pediatric pneumonia	14,125	1.9	248	114	2.19	46	156.1
Adult bronchitis and asthma	11,258	1.5	198	57	3.47	47	286.4
Pediatric bronchitis and asthma	17,685	2.4	311	178	1.75	50	310.6
Respiratory signs and symptoms	3,086	0.4	54	24	2.23	33	59.2
Other respiratory system diagnoses	4,044	0.5	71	40	1.79	39	24.9
MDC 5 - DISEASES AND DISORDERS OF THE CIRCULATORY SYSTEM:							
Cardiac valve procedures	632	0.1	11	7	1.68	15	192.2
Coronary bypass procedures	1,052	0.1	19	16	1.16	18	85.5
Cardiothoracic procedure	1,374	0.2	24	26	0.94	22	159.4
Vascular reconstruction procedure	715	0.1	13	9	1.47	16	52.0
Other vascular procedures	2,011	0.3	35	25	1.41	27	18.9
Pacemaker procedures	364	0.0	6	4	1.66	10	73.8
Acute myocardial infarction	2,957	0.4	52	34	1.51	33	67.2
Circulatory disorders exc. AMI, with cardiac cath.	5,045	0.7	89	65	1.38	40	145.2
Heart failure and shock	5,467	0.7	96	25	3.92	40	121.7
Deep vein thrombophlebitis	896	0.1	16	7	2.25	16	138.1
Peripheral vascular disorders	1,681	0.2	30	13	2.29	26	47.3
Atherosclerosis	717	0.1	13	4	3.08	16	404.6
Hypertension	1,522	0.2	27	9	2.89	24	490.5
Cardiac arrhythmias	2,702	0.4	48	28	1.71	33	23.3
Angina pectoris	6,320	0.8	111	40	2.80	41	97.0
Syncope and collapse	1,320	0.2	23	13	1.79	24	159.0
Chest pain	4,512	0.6	79	41	1.95	40	124.2
Other circulatory system diagnoses	2,791	0.4	49	25	1.93	33	85.5
MDC 6 - DISEASES AND DISORDERS OF THE DIGESTIVE SYSTEM:							
Major small and large bowel operations	2,275	0.3	40	31	1.30	28	15.0
Stomach, esophageal and duodenal operations	2,584	0.3	45	29	1.58	33	75.5
Anal and stomach operations	2,071	0.3	36	31	1.19	27	82.7

Table C.1, continued
All inpatient conditions: California, 1985-1986

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 6 - continued:							
Inguinal and femoral hernia operations	637	0.1	11	18	0.61	15	103.3
Pediatric hernia operations	1,033	0.1	18	23	0.79	18	36.0
Appendectomy with appendicitis	7,664	1.0	135	113	1.19	45	59.9
Other digestive disease operations	4,983	0.7	88	68	1.30	41	80.7
Digestive malignancy	885	0.1	16	4	3.53	16	450.8
Gastrointestinal hemorrhage	3,866	0.5	68	28	2.41	38	56.8
Peptic ulcer	1,084	0.1	19	9	2.12	19	79.6
Gastrointestinal obstruction	1,967	0.3	35	17	2.04	26	104.1
Adult gastroenteritis	11,239	1.5	198	107	1.86	47	114.7
Pediatric gastroenteritis	13,400	1.8	236	149	1.58	47	281.0
Dental and oral disorders or procedures	1,803	0.2	32	15	2.11	26	120.1
Other digestive disease diagnoses	3,404	0.5	60	38	1.56	34	80.9
MDC 7 - DISEASES AND DISORDERS OF THE HEPATOBILIARY SYSTEM:							
Cholecystectomy with gall bladder disease	7,675	1.0	135	73	1.86	43	82.0
Hepatobiliary system procedures	1,554	0.2	27	11	2.39	26	94.4
Other hepatobiliary system diagnoses	10,962	1.5	193	60	3.22	47	115.1
MDC 8 - DISEASES AND DISORDERS OF THE MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE:							
Major joint operations	1,216	0.2	21	14	1.50	21	19.2
Hip procedures except joint replacement	2,974	0.4	52	36	1.47	33	88.2
Back and neck procedures	2,077	0.3	37	54	0.67	27	204.3
Lower extrem/humer procedure exc hip/foot/femur	4,794	0.6	84	77	1.10	41	120.4
Knee procedures	1,294	0.2	23	44	0.51	22	245.7
Foot procedures	1,665	0.2	29	44	0.66	26	137.2
Hand procedures except ganglion	1,255	0.2	22	24	0.94	21	191.3
Other musculoskeletal system procedures	5,722	0.8	101	89	1.13	41	87.9
Fracture femur, hip or pelvis	1,759	0.2	31	22	1.41	26	78.4
Path fractures and connective tissue malignancy	764	0.1	13	7	1.87	16	156.8
Medical back problems	4,444	0.6	78	101	0.78	40	283.0
Other musculoskeletal system diagnoses	5,069	0.7	89	50	1.77	41	91.9

Table C.1, continued
All inpatient conditions: California, 1985-1986

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 8 - continued:							
Other fractures, sprains, strains or dislocations	3,474	0.5	61	49	1.25	35	124.6
MDC 9 - DISEASES AND DISORDERS OF THE SKIN, SUBCUTANEOUS TISSUE AND BREAST:							
Mastectomy for malignancy	851	0.1	15	22	0.68	16	64.9
Breast procedure or biopsy for nonmalignancy	445	0.1	8	23	0.34	12	96.5
Skin grafts	2,503	0.3	44	22	2.03	33	58.7
Other skin, subcutaneous tissue and breast procedure	2,018	0.3	36	29	1.22	26	71.2
Other skin, subcutaneous tissue and breast disorders	6,016	0.8	106	53	1.99	41	123.7
Cellulitis	7,024	0.9	124	49	2.53	43	128.3
MDC 10 - ENDOCRINE, NUTRITIONAL AND METOBOLIC DISEASES AND DISORDERS:							
Endocrine, nutritional and metobolic operations	2,024	0.3	36	31	1.14	27	80.9
Diabetes	7,917	1.1	139	49	2.84	44	72.3
Nutritional and misc. metobolic disorders	7,599	1.0	134	61	2.19	43	75.3
Other endocrine, nutritional and metabolic diagnoses	1,056	0.1	19	11	1.63	18	66.3
MDC 11 - DISEASES AND DISORDERS OF THE KIDNEY AND URINARY TRACT:							
Major genito-urinary tract operations	2,113	0.3	37	28	1.34	27	31.1
Prostatectomy	62	0.0	1	1	1.28	1	h/
Minor genito-urinary tract operations	1,709	0.2	30	12	2.52	26	83.3
Transurethral operations	506	0.1	9	11	0.83	13	74.1
Renal failure and dialysis	1,728	0.2	30	6	4.96	26	1,314.3
Kidney and urinary tract infections	7,557	1.0	133	55	2.41	43	58.4
Urinary tract stones	1,723	0.2	30	29	1.04	26	110.8
Kidney and urinary tract diagnoses	2,430	0.3	43	23	1.85	31	55.1

Table C.1, continued
All inpatient conditions: California, 1985-1986

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 12 - DISEASES AND DISORDERS OF THE MALE REPRODUCTIVE SYSTEM:							
Major male pelvic procedures	54	0.0	1	2	0.61	1	h/
Transurethral prostatectomy	397	0.1	7	10	0.73	12	34.8
Male reproductive system operations	1,246	0.2	22	37	0.60	20	58.0
Male reproductive system diagnoses	692	0.1	12	7	1.71	16	108.7
MDC 13 - DISEASES AND DISORDERS OF THE FEMALE REPRODUCTIVE SYSTEM:							
Female reproductive system operations	2,713	0.4	48	44	1.08	33	73.1
Tubal interruptions for nonmalignancy	558	0.1	10	11	0.91	14	444.4
D & C, conization exc for malignancy	1,038	0.1	18	16	1.13	18	191.4
Malignancy and infections, female reproductive system	8,038	1.1	141	54	2.62	45	292.4
Hysterectomy	8,426	1.1	148	167	0.89	45	185.6
Uterus and adnexa operations	1,923	0.5	69	78	0.88	39	170.4
Laparoscopy and endoscopy exc. tubal interruption	1,204	0.2	21	18	1.15	22	223.2
MDC 14 - MATERNITY-RELATED a/:							
Caesarean section	53,363	7.1	22,511	22,937	0.98	55	33.9 i/
Vaginal delivery with complicating diagnosis	13,282	1.8	5,603	5,423	1.03	47	97.0 i/
Vaginal delivery without complicating diagnosis	159,033	21.2	67,088	68,391	0.98	56	5.2 i/
Vaginal delivery with procedures	11,375	1.5	4,799	3,249	1.48	47	538.0 i/
Postpartum diagnoses	4,440	0.6	1,873	1,337	1.40	37	162.7 i/
Ectopic pregnancy	3,963	0.5	1,672	2,079	0.80	35	248.7 i/
Threatened abortion	8,356	1.1	3,525	3,035	1.16	43	329.2 i/
Abortion (spontaneous or therapeutic)	12,008	1.6	5,066	5,161	0.98	47	497.8 i/
False labor	4,931	0.7	2,080	1,801	1.16	39	69.9 i/
Other antepartum diagnoses	15,844	2.1	6,684	5,690	1.17	49	155.2 i/
MDC 16 - DISEASES AND DISORDERS OF BLOOD AND BLOOD FORMING ORGANS AND IMMUNOLOGICAL DISORDERS:							
Red blood cell disorders	5,773	0.8	102	31	3.27	41	1,249.1
Other blood disorders or procedures	3,737	0.5	66	35	1.90	38	321.4

Table C.1, continued
All inpatient conditions: California, 1985-1986

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 17 - MYELOPROLIFERATIVE DISEASES AND DISORDERS AND POORLY DIFFERENTIATED NEOPLASMS:							
Myeloproliferative disorders with procedures	1,007	0.1	18	13	1.40	18	98.3
Myeloproliferative disorders with diagnoses	2,942	0.4	52	24	2.17	33	187.2
Chemotherapy and radiotherapy	6,486	0.9	114	68	1.67	42	478.6
MDC 18 - INFECTIONS AND PARASITIS DISEASES (SYSTEMIC OR UNSPECIFIED SITES):							
Septicemia	2,876	0.4	51	25	2.05	33	133.2
Infectious disease diagnosis/procedure	7,777	1.0	137	90	1.52	43	114.3
MDC 19 - MENTAL DISEASES AND DISORDERS:							
Acute adjustment reaction	958	0.1	f/	f/	f/	f/	f/
Depressive neurosis	2,691	0.4	f/	f/	f/	f/	f/
Psychosis	23,500	3.1	f/	f/	f/	f/	f/
Other mental disorders or procedure	3,807	0.5	f/	f/	f/	f/	f/
MDC 20 - SUBSTANCE USE AND SUBSTANCE INDUCED ORGANIC MENTAL DISORDERS:							
Alcohol and drug use	1,722	0.2	f/	f/	f/	f/	f/
Alcohol and drug induced organic mental disorders	1,318	0.2	f/	f/	f/	f/	f/
MDC 21 - INJURIES, POISONINGS AND TOXIC EFFECT OF DRUGS:							
Operations for injuries	3,612	0.5	64	44	1.46	38	54.7
Poisoning and toxic effects of drugs	9,797	1.3	172	82	2.10	47	98.7
Complications of treatment	1,595	0.2	28	18	1.52	26	157.4
Other injuries, poisonings, toxic effects diagnoses	2,585	0.3	45	32	1.44	33	137.8

Table C.1, continued
All inpatient conditions: California, 1985-1986

Condition	Medicaid volume		Medicaid vs. non-Medicaid comparison			Geographic variation within Medicaid	
	Number of Medicaid cases	Percent of total Medicaid discharges	Observed Medicaid rate a/	Expected rate b,a/	Observed/ expected ratio	Number of counties c/	SCV d/
MDC 22 - BURNS	1,664	0.2	29	16	1.82	25	95.6
MDC 23 - FACTORS INFLUENCING HEALTH STATUS AND OTHER CONTACTS WITH HEALTH SERVICES	4,982	0.7	88	61	1.43	41	137.5

a/ Rates represent the number per 100,000 Medicaid enrollees, except for MDC 14 (maternity-related conditions), for which the rates represent the number per 100,000 Medicaid deliveries.
b/ The expected rate is the rate expected in the Medicaid population if it had the same age and sex-specific utilization pattern as the non-Medicaid population.
c/ Counties with fewer than six expected cases are excluded from the calculation of the SCV.
d/ Systematic component of variation; based on county-to-county differences in Medicaid utilization.
e/ The total for nonpregnancy related conditions does not equal the sum of medical, surgical, and psychiatric conditions because a small number of cases are included in the total but could not be classified.
f/ Values for psychiatric conditions are not included because of potential bias. Discharges from hospitals categorized as psychiatric or alcohol and drug, and large State mental institutions are not included in the data base. In addition, a large part of Medicaid psychiatric discharges funded through the California Short-Doyle program are probably misclassified.
g/ Rates for pregnancy-related conditions are based on the number of deliveries, and thus are not presented for the summary measure.
h/ The SCV could not be calculated reliably.
i/ Because of greater restrictiveness in the possible range of variation, SCVs for pregnancy-related conditions cannot be compared to those for nonpregnancy-related conditions.
NOTE: All analyses are based on the population under age 65.

Table C.2
All inpatient conditions: New York, 1985-1986

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
SUMMARY CONDITIONS:							
Nonpregnancy related e/	593,577	75.5	15,234	6,658	2.29	61	55.2
Medical	352,676	44.9	9,052	3,570	2.54	61	67.9
Surgical	133,079	16.9	3,416	2,705	1.26	61	43.8
Psychiatric	101,541	12.9	2,606	f/	f/	61	577.9
Pregnancy-related	192,425	24.5	g/	g/	g/	g/	g/
MDC 1 - DISEASES AND DISORDERS OF THE NERVOUS SYSTEM:							
Extracranial vascular procedures	176	0.0	5	5	0.91	4	h/
Nervous system operations	3,349	0.4	86	60	1.43	25	18.5
Specific cerebrovascular disorders	2,635	0.3	68	26	2.64	23	30.9
Transient ischemic attack and precerebral occlusion	1,023	0.1	26	14	1.85	11	132.6
Seizures and headaches	12,467	1.6	320	123	2.60	50	124.9
Stupor and coma	3,378	0.4	87	46	1.88	27	270.8
Concussion	3,107	0.4	80	79	1.01	24	373.5
Other nervous system diagnoses	8,735	1.1	224	129	1.74	46	181.5
MDC 2 - DISEASES AND DISORDERS OF THE EYE:							
Lens operations	1,833	0.2	47	25	1.85	17	67.5
Other eye operations	4,649	0.6	119	70	1.70	29	254.8
Eye disorders	2,652	0.3	68	28	2.44	23	243.7
MDC 3 - DISEASES AND DISORDERS OF THE EAR, NOSE, AND THROAT:							
Tonsillectomy and/or adenoidectomy	3,619	0.5	93	157	0.59	26	397.0
Other ear, nose, and throat operations	8,713	1.1	224	262	0.85	44	135.4
Adult otitis media and URI	1,760	0.2	45	19	2.34	17	125.8
Pediatric otitis media and URI	7,463	0.9	192	77	2.49	40	481.1
Other ear, nose, and throat diagnoses	4,849	0.6	124	78	1.59	29	101.9
MDC 4 - DISEASES AND DISORDERS OF THE RESPIRATORY SYSTEM:							
Respiratory system operations	1,803	0.2	46	23	2.04	18	40.1
Respiratory infections and inflammations	5,693	0.7	146	20	7.33	35	1,500.1
Respiratory neoplasms	2,019	0.3	52	23	2.22	17	74.2

Table C.2, continued
All inpatient conditions: New York, 1985-1986

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 4 - continued:							
Pulmonary edema and respiratory failure	667	0.1	17	6	2.89	9	40.5
Chronic obstructive pulmonary disease	2,639	0.3	68	18	3.79	22	221.7
Adult pneumonia	10,258	1.3	263	57	4.61	49	289.7
Pediatric pneumonia	9,331	1.2	239	95	2.53	48	372.4
Adult bronchitis and asthma	20,019	2.5	514	94	5.45	55	329.1
Pediatric bronchitis and asthma	22,520	2.9	578	207	2.80	56	331.0
Respiratory signs and symptoms	2,196	0.3	56	23	2.48	20	124.2
Other respiratory system diagnoses	4,276	0.5	110	47	2.31	29	32.7
MDC 5 - DISEASES AND DISORDERS OF THE CIRCULATORY SYSTEM:							
Cardiac valve procedures	440	0.1	11	7	1.73	8	9.4
Coronary bypass procedures	564	0.1	14	17	0.84	8	101.5
Cardiothoracic procedure	903	0.1	23	17	1.36	12	268.9
Vascular reconstruction procedure	663	0.1	17	10	1.78	9	48.5
Other vascular procedures	2,296	0.3	59	30	1.95	20	88.2
Pacemaker procedures	249	0.0	6	4	1.51	5	24.6
Acute myocardial infarction	3,280	0.4	84	55	1.53	24	38.1
Circulatory disorders exc. AMI, with cardiac cath.	5,344	0.7	137	71	1.93	30	113.0
Heart failure and shock	4,952	0.6	127	32	4.02	29	41.0
Deep vein thrombophlebitis	1,067	0.1	27	14	2.02	13	614.3
Peripheral vascular disorders	2,492	0.3	64	21	3.09	21	34.1
Atherosclerosis	627	0.1	16	7	2.39	8	327.3
Hypertension	1,957	0.2	50	15	3.45	17	267.1
Cardiac arrhythmias	2,739	0.3	70	37	1.88	23	70.2
Angina pectoris	6,895	0.9	177	70	2.53	37	120.6
Syncope and collapse	1,478	0.2	38	19	1.98	14	94.1
Chest pain	2,444	0.3	63	34	1.84	20	172.9
Other circulatory system diagnoses	2,888	0.4	74	30	2.51	23	71.9
MDC 6 - DISEASES AND DISORDERS OF THE DIGESTIVE SYSTEM:							
Major small and large bowel operations	1,853	0.2	48	34	1.38	17	h/
Stomach, esophageal and duodenal operations	1,869	0.2	48	26	1.81	18	36.2
Anal and stomach operations	2,633	0.3	68	49	1.39	23	72.2

Table C.2, continued
All inpatient conditions: New York, 1985-1986

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 6 - continued:							
Inguinal and femoral hernia operations	2,580	0.3	66	59	1.11	22	75.6
Pediatric hernia operations	3,977	0.5	102	69	1.48	28	303.6
Appendectomy with appendicitis	3,883	0.5	100	94	1.06	28	90.8
Other digestive disease operations	6,068	0.8	156	81	1.93	35	66.5
Digestive malignancy	938	0.1	24	9	2.80	11	34.1
Gastrointestinal hemorrhage	3,089	0.4	79	29	2.76	25	48.0
Peptic ulcer	1,191	0.2	31	14	2.23	13	20.8
Gastrointestinal obstruction	1,442	0.2	37	19	1.92	14	68.8
Adult gastroenteritis	10,346	1.3	266	143	1.86	48	359.1
Pediatric gastroenteritis	11,563	1.5	297	155	1.92	50	345.7
Dental and oral disorders or procedures	4,248	0.5	109	46	2.38	29	245.6
Other digestive disease diagnoses	4,728	0.6	121	64	1.88	29	127.8
MDC 7 - DISEASES AND DISORDERS OF THE HEPATOBILIARY SYSTEM:							
Cholecystectomy with gall bladder disease	5,464	0.7	140	86	1.63	29	99.2
Hepatobiliary system procedures	1,370	0.2	35	14	2.58	14	107.5
Other hepatobiliary system diagnoses	12,926	1.6	332	77	4.31	50	237.0
MDC 8 - DISEASES AND DISORDERS OF THE MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE:							
Major joint operations	685	0.1	18	15	1.20	9	2.8
Hip procedures except joint replacement	2,060	0.3	53	37	1.45	19	30.7
Back and neck procedures	1,271	0.2	33	45	0.73	13	88.8
Lower extrem/humer procedure exc hip/foot/femur	3,605	0.5	93	84	1.11	27	29.8
Knee procedures	1,259	0.2	32	74	0.44	13	79.8
Foot procedures	2,814	0.4	72	50	1.45	23	469.9
Hand procedures except ganglion	1,931	0.2	50	37	1.35	18	82.7
Other musculoskeletal system procedures	5,058	0.6	130	108	1.20	29	30.9
Fracture femur, hip or pelvis	921	0.1	24	21	1.12	12	27.3
Path fractures and connective tissue malignancy	695	0.1	18	11	1.58	9	65.1
Medical back problems	4,024	0.5	103	137	0.76	28	390.8
Other musculoskeletal system diagnoses	6,621	0.8	170	69	2.46	36	98.8

Table C.2, continued
All inpatient conditions: New York, 1985-1986

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 8 - continued:							
Other fractures, sprains, strains or dislocations	4,264	0.5	109	72	1.51	28	68.2
MDC 9 - DISEASES AND DISORDERS OF THE SKIN, SUBCUTANEOUS TISSUE AND BREAST:							
Mastectomy for malignancy	982	0.1	25	33	0.76	11	h/
Breast procedure or biopsy for nonmalignancy	2,632	0.3	68	72	0.94	21	913.5
Skin grafts	2,475	0.3	64	28	2.31	21	129.9
Other skin, subcutaneous tissue and breast procedure	4,707	0.6	121	84	1.44	29	147.9
Other skin, subcutaneous tissue and breast disorders	9,328	1.2	239	82	2.93	48	306.3
Cellulitis	9,300	1.2	239	63	3.78	48	334.4
MDC 10 - ENDOCRINE, NUTRITIONAL AND METOBOLIC DISEASES AND DISORDERS:							
Endocrine, nutritional and metobolic operations	2,016	0.3	52	37	1.40	18	17.5
Diabetes	8,650	1.1	222	63	3.55	42	84.4
Nutritional and misc. metobolic disorders	5,283	0.7	136	52	2.61	29	116.5
Other endocrine, nutritional and metabolic diagnoses	1,191	0.2	31	17	1.85	13	112.6
MDC 11 - DISEASES AND DISORDERS OF THE KIDNEY AND URINARY TRACT:							
Major genito-urinary tract operations	1,547	0.2	40	31	1.29	15	32.4
Prostatectomy	41	0.0	1	1	1.06	0	h/
Minor genito-urinary tract operations	1,688	0.2	43	23	1.91	17	223.5
Transurethral operations	547	0.1	14	18	0.80	8	206.0
Renal failure and dialysis	5,959	0.8	153	17	9.20	33	5,130.8
Kidney and urinary tract infections	6,281	0.8	161	66	2.45	34	39.9
Urinary tract stones	2,124	0.3	55	59	0.93	20	95.1
Kidney and urinary tract diagnoses	3,598	0.5	92	44	2.09	27	139.4

Table C.2, continued
All inpatient conditions: New York, 1985-1986

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: BCV d/
MDC 12 - DISEASES AND DISORDERS OF THE MALE REPRODUCTIVE SYSTEM:							
Major male pelvic procedures	75	0.0	2	2	0.96	3	h/
Transurethral prostatectomy	375	0.0	10	12	0.82	6	29.9
Male reproductive system operations	4,627	0.6	119	74	1.61	29	343.8
Male reproductive system diagnoses	1,598	0.2	41	17	2.35	16	456.1
MDC 13 - DISEASES AND DISORDERS OF THE FEMALE REPRODUCTIVE SYSTEM:							
Female reproductive system operations	4,131	0.5	106	69	1.53	27	15.2
Tubal interruptions for nonmalignancy	4,762	0.6	122	53	2.30	29	296.8
D & C, conization exc for malignancy	5,096	0.6	131	107	1.22	29	201.0
Malignancy and infections, female reproductive system	11,791	1.5	303	91	3.34	49	298.9
Hysterectomy	5,264	0.7	135	145	0.93	29	102.8
Uterus and adnexa operations	3,808	0.5	98	97	1.00	27	63.5
Laparoscopy and endoscopy exc. tubal interruption	1,919	0.2	49	51	0.97	17	269.6
MDC 14 - MATERNITY-RELATED a/:							
Caesarean section	26,557	3.4	21,398	24,361	0.88	57	20.1 i/
Vaginal delivery with complicating diagnosis	9,397	1.2	7,571	6,079	1.25	50	138.7 i/
Vaginal delivery without complicating diagnosis	81,742	10.4	65,861	66,672	0.99	61	7.5 i/
Vaginal delivery with procedures	6,416	0.8	5,170	2,888	1.79	38	647.3 i/
Postpartum diagnoses	3,430	0.4	2,764	1,786	1.55	28	147.5 i/
Ectopic pregnancy	2,918	0.4	2,351	2,042	1.15	25	182.2 i/
Threatened abortion	5,600	0.7	4,512	3,321	1.36	38	333.5 i/
Abortion (spontaneous or therapeutic)	35,702	4.5	28,766	20,348	1.41	60	975.2 i/
False labor	3,439	0.4	2,771	2,394	1.16	28	710.8 i/
Other antepartum diagnoses	17,224	2.2	13,878	10,238	1.36	56	228.3 i/
MDC 16 - DISEASES AND DISORDERS OF BLOOD AND BLOOD FORMING ORGANS AND IMMUNOLOGICAL DISORDERS:							
Red blood cell disorders	8,248	1.0	212	53	4.02	41	1,511.2
Other blood disorders or procedures	6,590	0.8	169	50	3.36	36	750.9

Table C.2, continued
All inpatient conditions: New York, 1985-1986

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 17 - MYELOPROLIFERATIVE DISEASES AND DISORDERS AND POORLY DIFFERENTIATED NEOPLASMS:							
Myeloproliferative disorders with procedures	1,076	0.1	28	20	1.40	13	h/
Myeloproliferative disorders with diagnoses	2,497	0.3	64	35	1.84	21	245.9
Chemotherapy and radiotherapy	5,027	0.6	129	89	1.44	29	440.9
MDC 18 - INFECTIONS AND PARASITIS DISEASES (SYSTEMIC OR UNSPECIFIED SITES):							
Septicemia	2,921	0.4	75	25	3.04	23	313.5
Infectious disease diagnosis/procedure	9,787	1.2	251	121	2.08	48	80.3
MDC 19 - MENTAL DISEASES AND DISORDERS:							
Acute adjustment reaction	1,197	0.2	31	f/	f/	13	217.7
Depressive neurosis	4,446	0.6	114	f/	f/	29	740.9
Psychosis	30,972	3.9	795	f/	f/	60	1,177.0
Other mental disorders or procedure	7,617	1.0	195	f/	f/	38	695.3
MDC 20 - SUBSTANCE USE AND SUBSTANCE INDUCED ORGANIC MENTAL DISORDERS:							
Alcohol and drug use	38,809	4.9	996	f/	f/	61	974.2
Alcohol and drug induced organic mental disorders	18,500	2.4	475	f/	f/	54	785.4
MDC 21 - INJURIES, POISONINGS AND TOXIC EFFECT OF DRUGS:							
Operations for injuries	2,823	0.4	72	41	1.78	23	70.8
Poisoning and toxic effects of drugs	13,516	1.7	347	91	3.81	51	79.2
Complications of treatment	1,270	0.2	33	17	1.89	13	56.2
Other injuries, poisonings, toxic effects diagnoses	3,000	0.4	77	31	2.47	23	171.4

Table C.3, continued
All inpatient conditions: Iowa, 1985-1987

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 4 - continued:							
Pulmonary edema and respitory failure	133	0.1	26	6	4.53	0	h/
Chronic obstructive pulmonary disease	306	0.3	59	11	5.46	15	364.1
Adult pneumonia	668	0.7	130	44	2.96	30	25.1
Pediatric pneumonia	2,152	2.4	418	177	2.36	32	172.0
Adult bronchitis and asthma	898	1.0	174	48	3.59	32	201.4
Pediatric bronchitis and asthma	2,548	2.8	495	213	2.32	32	210.0
Respiratory signs and symptoms	400	0.4	78	25	3.05	23	18.8
Other respiratory system diagnoses	448	0.5	87	46	1.87	26	117.4
MDC 5 - DISEASES AND DISORDERS OF THE CIRCULATORY SYSTEM:							
Cardiac valve procedures	31	0.0	6	4	1.41	0	h/
Coronary bypass procedures	65	0.1	13	13	0.98	0	h/
Cardiothoracic procedure	121	0.1	23	17	1.40	0	h/
Vascular reconstruction procedure	59	0.1	11	6	1.99	0	h/
Other vascular procedures	172	0.2	33	24	1.39	0	h/
Pacemaker procedures	16	0.0	3	2	1.61	0	h/
Acute myocardial infarction	265	0.3	51	25	2.06	9	123.9
Circulatory disorders exc. AMI, with cardiac cath.	417	0.5	81	56	1.45	26	704.6
Heart failure and shock	293	0.3	57	17	3.40	14	89.4
Deep vein thrombophlebitis	120	0.1	23	7	3.14	0	h/
Peripheral vascular disorders	199	0.2	39	17	2.30	0	h/
Atherosclerosis	55	0.1	11	8	1.29	0	h/
Hypertension	80	0.1	16	7	2.14	0	h/
Cardiac arrhythmias	205	0.2	40	28	1.41	0	h/
Angina pectoris	331	0.4	64	24	2.73	18	276.5
Syncope and collapse	168	0.2	33	15	2.14	0	h/
Chest pain	342	0.4	66	31	2.14	17	111.7
Other circulatory system diagnoses	165	0.2	32	21	1.51	0	h/
MDC 6 - DISEASES AND DISORDERS OF THE DIGESTIVE SYSTEM:							
Major small and large bowel operations	205	0.2	40	28	1.40	3	h/
Stomach, esophageal and duodenal operations	259	0.3	50	26	1.91	7	49.4
Anal and stomach operations	223	0.2	43	30	1.44	3	h/

Table C.3, continued
All inpatient conditions: Iowa, 1985-1987

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 6 - continued:							
Inguinal and femoral hernia operations	198	0.2	38	38	1.02	1	h/
Pediatric hernia operations	214	0.2	42	27	1.54	4	h/
Appendectomy with appendicitis	880	1.0	171	128	1.33	32	80.2
Other digestive disease operations	706	0.8	137	73	1.89	31	52.0
Digestive malignancy	36	0.0	7	4	1.69	0	h/
Gastrointestinal hemorrhage	229	0.3	44	18	2.40	5	100.5
Peptic ulcer	145	0.2	28	11	2.49	0	h/
Gastrointestinal obstruction	185	0.2	36	17	2.14	0	h/
Adult gastroenteritis	1,417	1.6	275	137	2.01	33	117.9
Pediatric gastroenteritis	1,665	1.9	323	184	1.76	33	154.1
Dental and oral disorders or procedures	278	0.3	54	15	3.49	8	240.4
Other digestive disease diagnoses	398	0.4	77	48	1.60	24	88.0
MDC 7 - DISEASES AND DISORDERS OF THE HEPATOBILIARY SYSTEM:							
Cholecystectomy with gall bladder disease	1,196	1.3	232	99	2.34	32	9.7
Hepatobiliary system procedures	91	0.1	18	8	2.10	0	h/
Other hepatobiliary system diagnoses	603	0.7	117	48	2.43	30	176.1
MDC 8 - DISEASES AND DISORDERS OF THE MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE:							
Major joint operations	95	0.1	18	15	1.22	0	h/
Hip procedures except joint replacement	267	0.3	52	23	2.26	9	65.1
Back and neck procedures	303	0.3	59	42	1.40	13	210.8
Lower extrem/humer procedure exc hip/foot/femur	369	0.4	72	53	1.36	23	13.1
Knee procedures	133	0.1	26	34	0.77	0	h/
Foot procedures	245	0.3	48	34	1.38	4	h/
Hand procedures except ganglion	96	0.1	19	12	1.59	0	h/
Other musculoskeletal system procedures	626	0.7	122	74	1.64	31	83.1
Fracture femur, hip or pelvis	162	0.2	31	16	1.99	0	h/
Path fractures and connective tissue malignancy	76	0.1	15	6	2.31	0	h/
Medical back problems	1,037	1.2	201	104	1.94	32	74.8
Other musculoskeletal system diagnoses	397	0.4	77	46	1.67	25	102.7

Table C.3, continued
All inpatient conditions: Iowa, 1985-1987

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 8 - continued:							
Other fractures, sprains, strains or dislocations	415	0.5	81	52	1.55	25	44.2
MDC 9 - DISEASES AND DISORDERS OF THE SKIN, SUBCUTANEOUS TISSUE AND BREAST:							
Mastectomy for malignancy	72	0.1	14	16	0.85	0	h/
Breast procedure or biopsy for nonmalignancy	103	0.1	20	17	1.20	0	h/
Skin grafts	227	0.3	44	15	2.87	4	h/
Other skin, subcutaneous tissue and breast procedure	258	0.3	50	28	1.77	7	131.6
Other skin, subcutaneous tissue and breast disorders	605	0.7	117	53	2.22	30	57.3
Cellulitis	502	0.6	97	38	2.55	30	197.2
MDC 10 - ENDOCRINE, NUTRITIONAL AND METOBOLIC DISEASES AND DISORDERS:							
Endocrine, nutritional and metobolic operations	480	0.5	93	35	2.65	30	291.6
Diabetes	831	0.9	161	54	3.01	31	83.1
Nutritional and misc. metobolic disorders	1,261	1.4	245	90	2.72	32	145.0
Other endocrine, nutritional and metabolic diagnoses	93	0.1	18	15	1.21	0	h/
MDC 11 - DISEASES AND DISORDERS OF THE KIDNEY AND URINARY TRACT:							
Major genito-urinary tract operations	233	0.3	45	30	1.49	4	h/
Prostatectomy	8	0.0	2	1	1.41	0	h/
Minor genito-urinary tract operations	145	0.2	28	12	2.37	0	h/
Transurethral operations	76	0.1	15	16	0.95	0	h/
Renal failure and dialysis	42	0.0	8	5	1.80	0	h/
Kidney and urinary tract infections	990	1.1	192	67	2.85	32	131.0
Urinary tract stones	271	0.3	53	54	0.97	10	85.9
Kidney and urinary tract diagnoses	270	0.3	52	27	1.92	9	9.9

Table C.3, continued
All inpatient conditions: Iowa, 1985-1987

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 12 - DISEASES AND DISORDERS OF THE MALE REPRODUCTIVE SYSTEM:							
Major male pelvic procedures	2	0.0	0	1	0.36	0	h/
Transurethral prostatectomy	15	0.0	3	7	0.42	0	h/
Male reproductive system operations	231	0.3	45	38	1.19	4	h/
Male reproductive system diagnoses	62	0.1	12	10	1.18	0	h/
MDC 13 - DISEASES AND DISORDERS OF THE FEMALE REPRODUCTIVE SYSTEM:							
Female reproductive system operations	302	0.3	59	29	2.03	12	143.2
Tubal interruptions for nonmalignancy	95	0.1	18	15	1.21	0	h/
D & C, conization exc for malignancy	120	0.1	23	10	2.25	0	h/
Malignancy and infections, female reproductive system	831	0.9	161	49	3.29	32	102.4
Hysterectomy j/	1,809	2.0	351	209	1.68	33	43.1
Laparoscopy and endoscopy exc. tubal interruption	76	0.1	15	5	3.25	0	h/
MDC 14 - MATERNITY-RELATED a/:							
Caesarean section	3,452	3.8	19,553	18,193	1.07	33	27.8 i/
Vaginal delivery with complicating diagnosis	1,069	1.2	6,055	5,815	1.04	32	131.1 i/
Vaginal delivery without complicating diagnosis	11,969	13.3	67,794	72,877	0.93	33	7.1 i/
Vaginal delivery with procedures	1,165	1.3	6,599	3,116	2.12	32	603.9 i/
Postpartum diagnoses	258	0.3	1,461	1,102	1.33	7	6.7 i/
Ectopic pregnancy	251	0.3	1,422	1,330	1.07	7	h/
Threatened abortion	765	0.9	4,333	2,661	1.63	31	397.0 i/
Abortion (spontaneous or therapeutic)	503	0.6	2,849	3,002	0.95	26	143.2 i/
False labor	958	1.1	5,426	2,898	1.87	31	463.4 i/
Other antepartum diagnoses	1,557	1.7	8,819	7,280	1.21	33	99.1 i/
MDC 16 - DISEASES AND DISORDERS OF BLOOD AND BLOOD FORMING ORGANS AND IMMUNOLOGICAL DISORDERS:							
Red blood cell disorders	204	0.2	40	12	3.31	2	h/
Other blood disorders or procedures	308	0.3	60	36	1.66	13	106.7

Table C.3, continued
All inpatient conditions: Iowa, 1985-1987

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 17 - MYELOPROLIFERATIVE DISEASES AND DISORDERS AND POORLY DIFFERENTIATED NEOPLASMS:							
Myeloproliferative disorders with procedures	81	0.1	16	11	1.37	0	h/
Myeloproliferative disorders with diagnoses	201	0.2	39	23	1.72	2	h/
Chemotherapy and radiotherapy	431	0.5	84	72	1.17	27	588.1
MDC 18 - INFECTIONS AND PARASITIS DISEASES (SYSTEMIC OR UNSPECIFIED SITES):							
Septicemia	338	0.4	66	24	2.78	17	214.8
Infectious disease diagnosis/procedure	1,044	1.2	203	123	1.65	32	79.7
MDC 19 - MENTAL DISEASES AND DISORDERS:							
Acute adjustment reaction	406	0.5	79	f/	f/	24	633.6
Depressive neurosis	1,478	1.6	287	f/	f/	33	284.3
Psychosis	4,794	5.3	931	f/	f/	33	433.5
Other mental disorders or procedure	3,139	3.5	609	f/	f/	33	341.0
MDC 20 - SUBSTANCE USE AND SUBSTANCE INDUCED ORGANIC MENTAL DISORDERS:							
Alcohol and drug use	2,187	2.4	425	f/	f/	33	223.8
Alcohol and drug induced organic mental disorders	1,337	1.5	260	f/	f/	32	238.2
MDC 21 - INJURIES, POISONINGS AND TOXIC EFFECT OF DRUGS:							
Operations for injuries	264	0.3	51	31	1.66	9	35.9
Poisoning and toxic effects of drugs	1,452	1.6	282	57	4.91	33	90.7
Complications of treatment	130	0.1	25	19	1.35	0	h/
Other injuries, poisonings, toxic effects diagnoses	268	0.3	52	23	2.28	8	264.8

Table C.3, continued
All inpatient conditions: Iowa, 1985-1987

Condition	Medicaid volume: Number of Medicaid cases	Medicaid volume: Percent of total Medicaid discharges	Medicaid vs. non-Medicaid comparison: Observed Medicaid rate a/	Medicaid vs. non-Medicaid comparison: Expected rate b,a/	Medicaid vs. non-Medicaid comparison: Observed/expected ratio	Geographic variation within Medicaid: Number of counties c/	Geographic variation within Medicaid: SCV d/
MDC 22 - BURNS	220	0.2	43	15	2.82	4	h/
MDC 23 - FACTORS INFLUENCING HEALTH STATUS AND OTHER CONTACTS WITH HEALTH SERVICES	535	0.6	104	106	0.98	30	212.2

a/ Rates represent the number per 100,000 Medicaid enrollees, except for MDC 14 (maternity-related conditions), for which the rates represent the number per 100,000 Medicaid deliveries.
b/ The expected rate is the rate expected in the Medicaid population if it had the same age and sex-specific utilization pattern as the non-Medicaid population.
c/ Counties with fewer than six expected cases are excluded from the calculation of the SCV.
d/ Systematic component of variation; based on county-to-county differences in Medicaid utilization.
e/ The total for nonpregnancy related conditions does not equal the sum of medical, surgical, and psychiatric conditions because a small number of cases are included in the total but could not be classified.
f/ Values for psychiatric conditions are not included because of potential bias. Discharges from hospitals categorized as psychiatric or alcohol and drug, and large State mental institutions are not included in the data base.
g/ Rates for pregnancy-related conditions are based on the number of deliveries, and thus are not presented for the summary measure.
h/ The SCV could not be calculated reliably.
i/ Because of greater restrictiveness in the possible range of variation, SCVs for pregnancy-related conditions cannot be compared to those for nonpregnancy-related conditions.
j/ Because of coding problems in the 1987 data, uterus and adnexa operations were pooled with hysterectomy in this State.
NOTE: All analyses are based on the population under age 65.

APPENDIX D

COUNTY-LEVEL INPATIENT UTILIZATION TABLES AND MAPS FOR THE MEDICAID POPULATION

D.1 INTRODUCTION

In this appendix we present county-level inpatient utilization tables and maps for the Medicaid population. Included are data for the following summary conditions: all nonpregnancy-related conditions, all nonpregnancy-related medical conditions, all nonpregnancy-related surgical conditions, and all psychiatric conditions. Tables include the following data by county: the number of Medicaid enrollees in the county; the number of Medicaid admissions observed in the county for the condition; the observed rate for the Medicaid population living in the county; the rate expected if the county Medicaid population had the same age and sex-specific utilization pattern as the statewide Medicaid population; the observed to expected ratio; the adjusted rate, representing the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization (Fleiss, 1973); and the statistical significance of the difference between the observed and expected rates. A map displaying the county-level utilization patterns accompanies each table. The shading of the maps reflects the level of significance of the difference between the observed and expected rate for each county. (Keep in mind that the level of significance for a given county is a function of the size of the difference between the observed and expected rates and the size of the county Medicaid population.) The terms "high" and "low" refer to geographic areas whose observed rates were significantly higher or lower than their expected rates.

The discussion focuses on areas whose admission rates are significantly higher than expected at the .01 or .001 level. It also focuses on major urban areas, where most of the States' Medicaid enrollees reside.

Because of the volume of material, we focus here on the summary inpatient conditions. County-level tables and maps also are available for selected specific inpatient conditions from the Health Care Financing Administration's Office of Research and Demonstrations.

D.2 CALIFORNIA (1985-1986)

Figure D.1 presents an index of counties in California. Table D.1 presents the county-level utilization data for all nonpregnancy-related conditions for the Medicaid population and Figure D.2 is the corresponding map. Several clusters of high admission rates were apparent in the California county map for all admissions. These included five southern counties (Riverside, Imperial, Los Angeles, San Luis Obispo, and Ventura), the San Francisco Bay area (San Francisco, Alameda), several northeast counties (Modoc, Lassen, Plumas, Yuba, Butte, Sierra, and Glenn), two northwest counties (Humboldt and Trinity), and three counties in central California (Tuolumne, Mariposa, and Madera). Only a few counties had admission rates which were not statistically significant, whether above or below expected. There were clusters of high and low counties throughout the State. The overall range of variation in adjusted rates for all

Figure D.1
Index of County Clusters, California

Figure D.1, Continued
Index of County Clusters, California

1. Alameda County
2. Alpine County
3. Amador County
4. Butte County
5. Calaveras County
6. Colusa County
7. Contra Costa County
8. Del Norte County
9. El Dorado County
10. Fresno County
11. Glenn County
12. Humboldt County
13. Imperial County
14. Inyo County
15. Kern County
16. Kings County
17. Lake County
18. Lassen County
19. LosAngeles County
20. Madera County
21. Marin County
22. Mariposa County
23. Mendocino County
24. Merced County
25. Modoc County
26. Mono County
27. Monterey County
28. Napa County
29. Nevada County
30. Orange County
31. Placer County
32. Plumas County
33. Riverside County
34. Sacramento County
35. San Benito County
36. San Bernardino County
37. San Diego County
38. San Francisco County
39. San Joaquin County
40. San Luis Obispo County
41. San Mateo County
42. Santa Barbara County

Figure D.1, Continued
Index of County Clusters, California

43. Santa Clara County
44. Santa Cruz County
45. Shasta County
46. Sierra County
47. Siskiyou County
48. Solano County
49. Sonoma County
50. Stanislaus County
51. Sutter County
52. Tehama County
53. Trinity County
54. Tulare County
55. Tuolumne County
56. Ventura County
57. Yolo County
58. Yuba County

Table D.1

Within Medicaid Variation by County
All Nonpregnancy-related Admissions, California, 1985-1986

Geographic Area	Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
TOTAL CALIFORNIA	5,884,183	463,925	81.82	81.82	1.00	81.62	1.000
ALAMEDA COUNTY	244,288	22,732	83.05	85.01	1.08	89.34	0.001
ALPINE COUNTY	327	17	81.88	74.87	0.70	58.80	0.135
AMADOR COUNTY	3,178	282	82.44	82.30	1.00	81.76	0.878
BUTTE COUNTY	48,308	4,488	88.30	83.87	1.18	88.51	0.001
CALAVERAS COUNTY	6,103	520	85.20	82.00	1.04	84.80	0.382
COLUSA COUNTY	4,420	307	88.48	82.87	0.84	88.32	0.002
CONTRACOSTA COUNTY	108,478	8,885	82.14	84.18	1.08	88.32	0.001
DELNORTE COUNTY	8,078	484	54.43	81.30	0.87	54.84	0.001
ELDORADO COUNTY	16,818	1,212	73.37	78.70	0.82	75.14	0.004
FRESNO COUNTY	237,107	18,834	85.84	78.80	0.84	88.28	0.001
GLENN COUNTY	5,837	535	80.11	80.24	1.12	81.88	0.007
HUMBOLDT COUNTY	36,503	3,280	80.13	83.88	1.08	87.83	0.001
IMPERIAL COUNTY	38,405	3,823	88.58	84.06	1.18	88.87	0.001
INYO COUNTY	3,570	385	107.84	85.30	1.28	103.18	0.001
KERN COUNTY	128,388	8,834	88.80	80.83	0.88	70.18	0.001
KINGS COUNTY	28,650	2,825	108.00	77.81	1.37	111.47	0.001
LAKE COUNTY	15,637	1,375	87.83	88.20	1.02	83.28	0.481
LASSEN COUNTY	7,358	838	114.01	81.01	1.41	114.88	0.001
LOS ANGELES COUNTY	1,867,277	188,888	81.28	78.88	1.02	82.87	0.001
MADERA COUNTY	28,051	2,585	88.81	81.82	1.22	88.37	0.001
MARIN COUNTY	15,138	2,088	137.82	80.41	1.52	124.41	0.001
MARIPOSA COUNTY	3,375	388	108.44	81.28	1.33	108.88	0.001
MENDOCINO COUNTY	24,398	1,754	71.80	81.50	0.88	72.00	0.001
MERCED COUNTY	84,185	4,873	75.82	78.08	0.87	78.38	0.052
MODOC COUNTY	2,502	253	101.12	81.28	1.24	101.57	0.001
MONO COUNTY	715	72	100.70	81.78	1.23	100.48	0.077
MONTEREY COUNTY	58,082	4,250	71.83	78.82	0.80	73.48	0.001
NAPA COUNTY	13,422	1,478	108.87	88.00	1.24	100.85	0.001
NEVADA COUNTY	11,848	870	83.28	81.87	1.02	82.81	0.624
ORANGE COUNTY	184,708	18,227	83.34	85.83	0.87	78.18	0.001
PLACER COUNTY	22,385	1,758	78.48	83.48	0.84	78.88	0.009
PLUMAS COUNTY	4,217	585	141.10	82.47	1.71	138.83	0.001
RIVERSIDE COUNTY	205,577	17,004	82.71	78.88	1.04	84.50	0.001
SACRAMENTO COUNTY	238,030	18,148	75.82	82.18	0.82	75.40	0.001
SAN BENITO COUNTY	7,428	427	57.48	78.27	0.78	81.51	0.001
SAN BERNARDINO COUNTY	307,022	20,058	85.33	78.38	0.83	88.08	0.001
SAN DIEGO COUNTY	384,428	31,218	81.20	80.82	1.00	82.00	0.408
SAN FRANCISCO COUNTY	143,307	18,873	137.28	87.78	1.40	114.58	0.001
SAN JOAQUIN COUNTY	188,338	10,245	80.88	80.71	0.75	81.84	0.001
SAN LUIS OBISPO COUNTY	21,848	2,228	101.83	88.82	1.18	88.44	0.001
SAN MATEO COUNTY	32,888	3,881	121.04	85.81	1.28	103.01	0.001
SANTA CLARA COUNTY	208,280	13,817	85.38	81.88	0.80	85.08	0.001
SANTA CRUZ COUNTY	35,163	2,878	84.72	83.81	1.01	82.50	0.558
SHASTA COUNTY	48,333	3,404	73.47	82.80	0.88	72.88	0.001
SIERRA COUNTY	674	85	128.11	81.07	1.38	113.03	0.003
SISKIYOU COUNTY	14,075	672	47.74	82.31	0.88	47.34	0.001
SOLANO COUNTY	45,307	4,284	84.85	80.30	1.18	88.10	0.001
SONOMA COUNTY	48,084	8,555	113.17	87.28	1.30	105.88	0.001
STANISLAUS COUNTY	108,010	8,217	77.81	82.38	0.84	78.78	0.001

Table D.1, Continued

Within Medicaid Variation by County
All Nonpregnancy-related Admissions, California, 1985-1986

Geographic Area	Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
SUTTER COUNTY	18,541	1,268	76.54	82.51	0.93	75.71	0.007
TEHAMA COUNTY	13,582	1,001	73.81	83.24	0.88	72.37	0.001
TRINITY COUNTY	3,624	405	111.75	82.85	1.35	108.86	0.001
TULARE COUNTY	107,283	8,328	77.61	81.04	0.96	78.16	0.001
TUOLUMNE COUNTY	8,021	1,037	128.29	82.23	1.57	128.33	0.001
VENTURA COUNTY	87,313	8,432	88.57	80.87	1.20	87.71	0.001
YOLO COUNTY	26,926	2,088	76.80	84.11	0.91	74.53	0.001
YUBA COUNTY	22,458	2,082	83.15	85.58	1.08	88.82	0.001

a/ The expected rate is the rate expected in the county Medicaid population if it had the same age and sex-specific utilization pattern as the statewide Medicaid population.

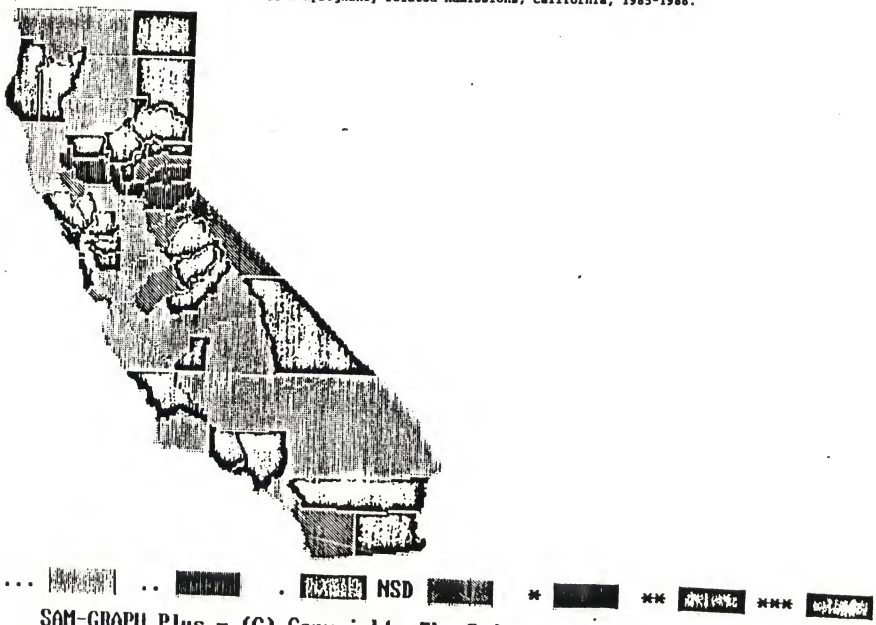
b/ The adjusted rate represents the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization.

c/ Statistical significance level of the difference between the observed and expected rates.

NOTE: All analyses are based on the population under age 65.

Figure D.2

Within-Medicaid Observed Versus Expected Rates by County:
All Nonpregnancy-related Admissions, California, 1985-1986.



admissions was almost threefold, from 47 to 140 per 1,000 person-years of Medicaid enrollment. Counties in the two largest urban concentrations -- Los Angeles and San Francisco/Alameda -- had relatively high admission rates. Rural counties covered the full range from high to low rates.

Several major population centers exhibited lower-than-expected admission rates, including Sacramento, Fresno, and Modesto.

Table D.2 presents county-level utilization data for all nonpregnancy related medical conditions in California and Figure D.3 is the corresponding map. The data for all medical admissions presents a similar pattern to that observed for all admissions. This is not surprising because admissions for medical conditions made up 66.3 percent of all nonpregnancy related admissions in California. Outside the major population centers, most of the medical admission rates were low, especially in the San Joaquin Valley from Sacramento to Fresno. Again, counties with higher admission rates clustered in the northeast, east central, and southeast regions. All of the counties surrounding San Francisco Bay had high medical admission rates, as did Los Angeles and Ventura Counties in the south.

There was a considerable difference between the patterns for all medical and all surgical admissions. Table D.3 presents county-level data for all nonpregnancy related surgical conditions, and Figure D.4 is the corresponding map. Statewide, for all medical admissions there was a 3.4-fold difference in the admission rate between the highest-rate and lowest-rate counties,

Table D.2

Within Medicaid Variation by County
All Medical, California 1986-1988

Geographic Area	Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
TOTAL CALIFORNIA	8,884,193	307,594	54.11	54.11	1.00	54.11	1.000
ALAMEDA COUNTY	244,289	14,652	60.80	55.89	1.09	58.88	0.001
ALPINE COUNTY	327	9	27.52	49.19	0.56	30.28	0.077
AMADOR COUNTY	3,179	135	42.48	53.08	0.80	43.32	0.010
BUTTE COUNTY	45,309	2,784	61.67	54.80	1.13	60.89	0.001
CALAVERAS COUNTY	6,103	305	49.98	52.61	0.95	51.21	0.338
COLUSA COUNTY	4,420	168	38.01	55.03	0.69	37.38	0.001
CONTRACOSTA COUNTY	108,479	6,043	55.71	55.15	1.01	54.66	0.437
DELNORTE COUNTY	9,076	284	31.29	52.94	0.59	31.99	0.001
ELDORADO COUNTY	16,519	564	40.20	51.55	0.78	42.11	0.001
FRESNO COUNTY	237,107	10,649	44.91	52.30	0.86	46.47	0.001
GLENN COUNTY	5,937	327	55.08	53.08	1.04	56.17	0.500
HUMBOLDT COUNTY	36,503	1,988	54.48	54.36	1.00	54.22	0.832
IMPERIAL COUNTY	39,405	2,754	69.89	55.56	1.26	68.07	0.001
INYO COUNTY	3,570	240	67.23	56.34	1.19	64.57	0.006
KERN COUNTY	128,368	6,011	46.83	54.20	0.86	46.75	0.001
KINGS COUNTY	26,650	2,087	78.31	51.77	1.51	81.85	0.001
LAKE COUNTY	15,637	907	58.00	56.63	1.02	55.43	0.471
LASSEN COUNTY	7,359	584	79.36	52.42	1.51	81.92	0.001
LOS ANGELES COUNTY	1,967,277	112,486	57.18	53.80	1.07	57.73	0.001
MADERA COUNTY	26,051	1,585	60.84	54.33	1.12	60.81	0.001
MARIN COUNTY	15,136	1,021	67.46	58.12	1.16	62.91	0.001
MARIPOSA COUNTY	3,375	227	67.26	52.61	1.28	69.18	0.001
MENDOCINO COUNTY	24,396	1,079	44.23	52.92	0.84	45.23	0.001
MERCED COUNTY	64,185	3,332	51.91	52.12	1.00	53.89	0.915
MODOC COUNTY	2,502	175	69.94	52.94	1.32	71.50	0.001
MONO COUNTY	715	48	67.13	54.40	1.23	65.78	0.144
MONTEREY COUNTY	59,082	2,912	49.29	53.00	0.93	50.32	0.001
NAPA COUNTY	13,422	811	60.42	57.55	1.05	58.82	0.185
NEVADA COUNTY	11,648	652	55.98	52.78	1.06	57.39	0.133
ORANGE COUNTY	194,706	9,764	50.15	56.66	0.89	47.90	0.001
PLACER COUNTY	22,385	1,187	53.03	54.34	0.98	52.81	0.400
PLUMAS COUNTY	4,217	419	99.36	53.61	1.85	100.30	0.001
RIVERSIDE COUNTY	205,577	11,882	57.80	52.91	1.09	59.12	0.001
SACRAMENTO COUNTY	239,030	11,838	49.69	54.19	0.90	48.62	0.001
SAN BENITO COUNTY	7,429	234	31.50	50.81	0.62	33.66	0.001
SAN BERNARDINO COUNTY	307,022	13,637	44.42	51.49	0.88	46.68	0.001
SAN DIEGO COUNTY	384,428	20,027	52.10	53.24	0.98	52.95	0.002
SAN FRANCISCO COUNTY	143,307	12,112	84.52	64.48	1.31	70.94	0.001
SAN JOAQUIN COUNTY	168,339	8,837	41.21	53.33	0.77	41.81	0.001
SAN LUIS OBISPO COUNTY	21,845	1,567	71.41	56.80	1.26	68.27	0.001
SAN MATEO COUNTY	32,888	2,179	66.25	63.36	1.05	56.58	0.037
SANTA CLARA COUNTY	208,290	9,026	43.33	54.08	0.80	43.36	0.001
SANTA CRUZ COUNTY	35,163	1,538	43.74	54.97	0.80	43.06	0.001
SHASTA COUNTY	46,333	2,128	45.93	53.55	0.86	46.41	0.001
SIERRA COUNTY	874	60	89.02	60.46	1.47	79.68	0.003
SISKIYOU COUNTY	14,075	411	29.30	53.68	0.54	29.44	0.001
SOLANO COUNTY	45,307	2,517	55.55	52.80	1.05	56.84	0.011
SONOMA COUNTY	49,084	3,566	72.65	56.81	1.28	69.20	0.001
STANISLAUS COUNTY	106,010	5,023	47.39	54.25	0.87	47.26	0.001

Table D.2, Continued

Within Medicaid Variation by County
All Medical, California 1985-1986

Geographic Area	Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
SUTTER COUNTY	16,541	761	46.01	54.12	0.85	46.00	0.001
TEHAMA COUNTY	13,562	642	47.34	54.56	0.87	48.85	0.001
TRINITY COUNTY	3,624	281	77.54	53.76	1.44	78.05	0.001
TULARE COUNTY	107,283	5,843	54.46	54.05	1.01	54.53	0.562
TUOLUMNE COUNTY	8,021	621	77.42	53.43	1.45	78.41	0.001
VENTURA COUNTY	87,313	4,035	46.21	53.20	0.87	47.00	0.001
YOLO COUNTY	26,826	1,312	48.73	55.44	0.88	47.56	0.001
YUBA COUNTY	22,458	1,412	62.87	56.54	1.11	60.17	0.001

a/ The expected rate is the rate expected in the county Medicaid population if it had the same age and sex-specific utilization pattern as the statewide Medicaid population.

b/ The adjusted rate represents the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization.

c/ Statistical significance level of the difference between the observed and expected rates.

NOTE: All analyses are based on the population under age 65.

Figure D.3

Within-Medicaid Observed Versus Expected Rates by County:
All Medical Admissions, California 1985-1986.

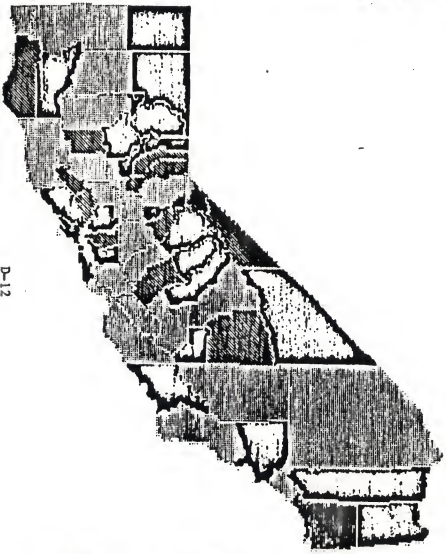


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Table D.3

Within Medicaid Variation by County
All Surgical, California 1985-1986

Geographic Area	Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
TOTAL CALIFORNIA	5,884,183	115,761	20.37	20.37	1.00	20.37	1.000
ALAMEDA COUNTY	244,288	5,114	20.83	21.47	0.97	19.88	0.070
ALPINE COUNTY	327	8	24.46	18.75	1.30	26.57	1.000
AMADOR COUNTY	3,178	112	35.24	21.27	1.66	33.74	0.001
BUTTE COUNTY	45,308	1,604	35.40	21.30	1.66	33.84	0.001
CALAVERAS COUNTY	6,103	199	32.61	21.21	1.54	31.30	0.001
COLUSA COUNTY	4,420	118	26.70	20.71	1.29	26.25	0.006
CONTRACOSTA COUNTY	104,479	2,057	19.86	21.35	0.88	19.09	0.001
DELNORTE COUNTY	9,078	201	22.15	20.59	1.08	21.80	0.302
ELDORADO COUNTY	16,519	511	30.93	20.45	1.51	30.80	0.001
FRESNO COUNTY	237,107	4,265	17.99	19.57	0.92	18.72	0.001
GLENN COUNTY	5,837	184	32.88	20.12	1.62	33.07	0.001
HUMBOLDT COUNTY	36,503	1,204	32.88	21.19	1.56	31.70	0.001
IMPERIAL COUNTY	39,405	979	24.84	21.13	1.18	23.95	0.001
INYO COUNTY	3,570	83	26.05	21.28	1.22	24.93	0.051
KERN COUNTY	128,368	2,191	16.99	20.00	0.85	17.30	0.001
KINGS COUNTY	26,650	685	25.70	19.24	1.34	27.21	0.001
LAKE COUNTY	15,637	406	25.96	21.68	1.20	24.37	0.001
LASSEN COUNTY	7,359	208	28.26	20.91	1.36	27.66	0.001
LOS ANGELES COUNTY	1,867,277	36,032	18.32	19.73	0.93	18.90	0.001
MADERA COUNTY	26,051	783	30.06	20.35	1.48	30.08	0.001
MARIN COUNTY	15,136	662	43.74	23.35	1.87	38.15	0.001
MARIPOSA COUNTY	3,375	104	30.81	20.79	1.48	30.18	0.001
MENDOCINO COUNTY	24,386	577	23.65	20.96	1.13	23.05	0.003
MERCED COUNTY	64,185	1,428	22.25	19.21	1.16	23.59	0.001
MODOC COUNTY	2,502	63	25.19	20.68	1.22	24.79	0.118
MONO COUNTY	715	19	26.57	20.30	1.31	26.66	0.238
MONTEREY COUNTY	59,082	1,086	18.38	19.84	0.92	19.79	0.007
NAPA COUNTY	13,422	448	33.38	22.77	1.47	29.95	0.001
NEVADA COUNTY	11,648	283	25.15	21.13	1.19	24.24	0.003
ORANGE COUNTY	194,706	4,191	21.47	21.43	1.00	20.41	0.889
PLACER COUNTY	22,385	511	22.83	21.33	1.07	21.79	0.125
PLUMAS COUNTY	4,217	141	33.44	21.16	1.58	32.19	0.001
RIVERSIDE COUNTY	205,577	3,588	17.45	20.02	0.87	17.76	0.001
SACRAMENTO COUNTY	239,230	6,259	22.00	20.59	1.07	21.76	0.001
SAN BENITO COUNTY	7,429	178	23.89	19.10	1.24	25.27	0.004
SAN BERNARDINO COUNTY	307,022	5,087	16.57	19.91	0.84	17.04	0.001
SAN DIEGO COUNTY	384,428	7,700	20.03	20.37	0.98	20.02	0.138
SAN FRANCISCO COUNTY	143,307	4,153	28.99	24.30	1.18	24.28	0.001
SAN JOAQUIN COUNTY	188,338	2,979	17.70	20.11	0.88	17.92	0.001
SAN LUIS OBISPO COUNTY	21,945	614	27.88	21.57	1.30	26.42	0.001
SAN MATEO COUNTY	32,888	877	26.67	23.89	1.12	22.74	0.001
SANTA CLARA COUNTY	208,280	3,446	16.54	20.55	0.81	16.40	0.001
SANTA CRUZ COUNTY	35,183	844	24.00	21.14	1.14	23.12	0.001
SHASTA COUNTY	48,333	1,183	25.83	21.11	1.21	24.63	0.001
SIERRA COUNTY	674	24	35.61	22.62	1.57	32.06	0.025
SISKIYOU COUNTY	14,075	247	17.55	20.96	0.84	17.13	0.006
SOLANO COUNTY	45,307	1,182	26.09	20.33	1.28	26.14	0.001
SONOMA COUNTY	48,084	1,775	36.16	22.11	1.64	33.31	0.001
STANISLAUS COUNTY	108,010	2,868	27.88	20.71	1.35	27.51	0.001

Table D.3, Continued

Within Medicaid Variation by County
All Surgical, California 1985-1986

Geographic Area	Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
SUTTER COUNTY	16,541	463	27.98	20.81	1.34	27.39	0.001
TEHAMA COUNTY	13,562	335	24.70	21.05	1.17	23.80	0.003
TRINITY COUNTY	3,824	107	28.53	21.14	1.40	28.44	0.001
TULARE COUNTY	107,283	2,276	21.21	18.88	1.06	21.63	0.004
TUOLUMNE COUNTY	8,021	311	38.77	21.07	1.84	37.48	0.001
VENTURA COUNTY	87,313	1,779	20.37	20.27	1.01	20.47	0.821
YOLO COUNTY	26,826	561	20.83	21.12	0.88	20.08	0.748
YUBA COUNTY	22,458	637	28.38	21.35	1.33	27.05	0.001

a/ The expected rate is the rate expected in the county Medicaid population if it had the same age and sex-specific utilization pattern as the statewide Medicaid population.

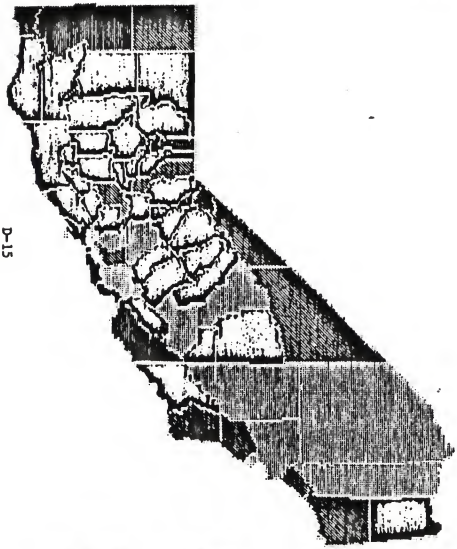
b/ The adjusted rate represents the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization.

c/ Statistical significance level of the difference between the observed and expected rates.

NOTE: All analyses are based on the population under age 65.

Figure D.4

Within-Medicaid Observed Versus Expected Rates by County:
All Surgical Admissions, California 1985-1986.



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whereas for all surgical admissions the range was only 2.2-fold. The distribution of surgical admission rates by county was also very different from the pattern for all medical admissions, discussed above. High surgical admission rates were found in nearly all of the predominantly rural counties in the northern and central sections of the State. In the southern third of the State, Imperial, Kings, and San Luis Obispo counties also showed high rates. Among the predominantly urban counties in the San Francisco Bay Area, only Contra Costa had a low admissions surgical admission rate, and the rate for Alameda, which contains the city of Oakland, showed no significant difference from expected. Los Angeles County's rate was below average for surgical admissions, while San Diego's did not differ significantly from expected.

Data for psychiatric conditions are not presented for California because a large part of Medicaid psychiatric utilization may have been misclassified (diBernardi, 1991).

In summary, admission rates among Medicaid enrollees in California's most urbanized and populous counties -- Los Angeles, Alameda, and San Francisco -- were consistently above their expected rates in the summary categories of all admissions and all medical admissions. Admission rates in Sacramento and Fresno counties, where much of the population is rural apart from the one large city in each, were below their expected rates. Admission rates in San Diego County, which contains the third largest metropolitan area in California, did not differ significantly from expected. Admissions in the remaining

counties, where the populations are largely rural, were widely dispersed along the entire spectrum of admission rates.

The pattern across counties for all surgical admissions was quite different. All of the major urban counties except San Francisco and Sacramento had admission rates below their expected rates. The highest admission rates were concentrated among rural counties in central and northern California.

We also generated tables and maps describing Medicaid utilization patterns for smaller geographic areas, called hospital market areas, within the following urban settings: Los Angeles, San Franciso/Oakland, and San Diego. Because of the volume of material, these data are not presented here, but are available from the Health Care Financing Administration's Office of Research and Demonstrations.

D.3. NEW YORK (1985-1986)

Figure D.5 presents an index of the county-clusters used in New York. Table D.4 presents the Medicaid utilization data for all nonpregnancy related conditions for these county-clusters, and Figure D.6 is the corresponding map. Note that the data obtained from the State Medicaid agency included only on a subset of zip codes that contain approximately 95 percent of the Medicaid population of the State. Utilization rates for a number of counties with small Medicaid populations in this State thus only include data for zip codes that contain reasonably large Medicaid populations. Zip codes that include only very small

Figure D.5
Index of County Clusters, New York

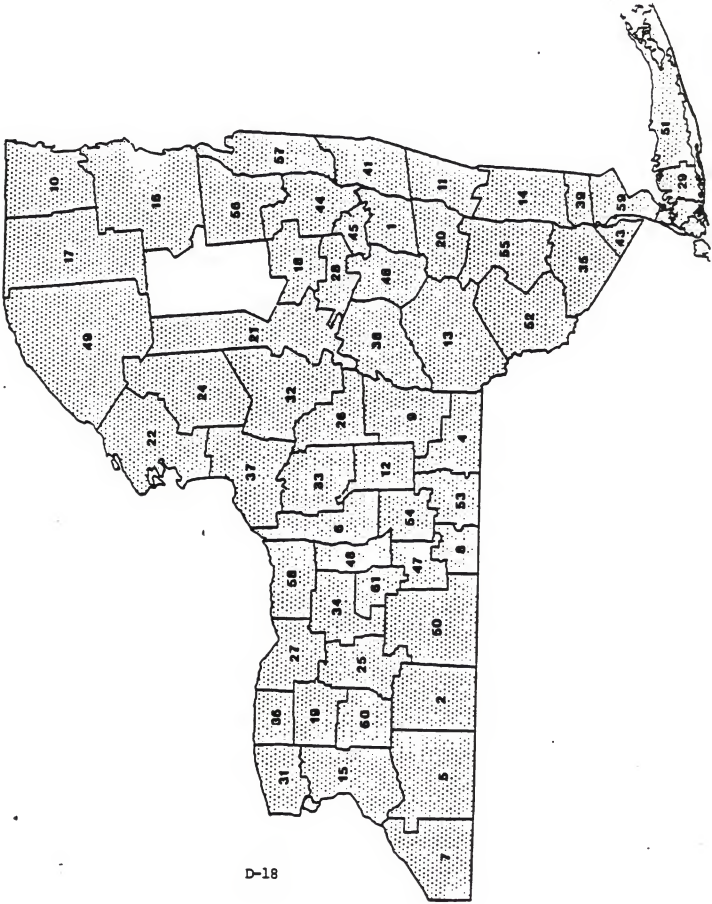


Figure D.5, Continued
Index of County Clusters, Continued

1. Albany County
2. Allegany County
3. Bronx County
4. Broome County
5. Cattaraugus County
6. Cayuga County
7. Chautauqua County
8. Chemung County
9. Chenango County
10. Clinton County
11. Columbia County
12. Cortland County
13. Delaware County
14. Dutchess County
15. Erie County
16. Essex County
17. Franklin County
18. Fulton County
19. Genesee County
20. Greene County
21. Herkimer County
22. Jefferson County
23. Kings County
24. Lewis County
25. Livingston County
26. Madison County
27. Monroe County
28. Montgomery County
29. Nassau County
30. New York County
31. Niagara County
32. Oneida County
33. Onondaga County
34. Ontario County
35. Orange County
36. Orleans County
37. Oswego County
38. Otsego County
39. Putnam County
40. Queens County
41. Rensselaer County
42. Richmond County
43. Rockland County

Figure D.5, Continued
Index of County Clusters, New York

44. Saratoga County
45. Schenectady County
46. Schoharie County
47. Schuyler County
48. Seneca County
49. St. Lawrence County
50. Steuben County
51. Suffolk County
52. Sullivan County
53. Tioga County
54. Tompkins County
55. Ulster County
56. Warren County
57. Washington County
58. Wayne County
59. Westchester County
60. Wyoming County
61. Yates County

Table D.4

Within Medicaid Variation by County
All Nonpregnancy-related Admissions, New York, 1985-1986

Geographic Area	Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif Level c/
Total New York	3,886,271	583,577	152.34	152.34	1.00	152.34	1.000
Albany County	26,298	3,485	132.52	147.20	0.90	137.15	0.001
Allegany County	4,137	746	180.32	162.70	1.11	168.85	0.005
Bronx County	698,200	108,571	155.85	143.58	1.08	165.47	0.001
Broome County	20,808	3,414	163.30	164.20	0.99	151.51	0.748
Cattaraugus County	10,013	1,848	184.66	162.37	1.14	173.26	0.001
Cayuga County	8,828	1,528	173.08	158.23	1.09	165.80	0.001
Chautauqua County	20,482	3,481	169.87	158.37	1.07	163.41	0.001
Chemung County	18,313	2,075	113.31	158.71	0.71	108.09	0.001
Chenango County	4,243	613	144.47	157.12	0.92	140.08	0.038
Clinton County	6,584	924	140.34	168.53	0.83	126.86	0.001
Columbia County	4,856	527	113.18	142.84	0.79	120.72	0.001
Cortland County	6,295	1,145	181.89	164.86	1.10	167.98	0.001
Delaware County	2,848	650	228.15	156.43	1.46	222.20	0.001
Dutchess County	15,263	2,553	167.27	152.30	1.10	167.32	0.001
Erie County	202,385	25,283	124.83	160.93	0.78	118.26	0.001
Essex County	4,694	714	152.11	157.81	0.96	146.85	0.326
Franklin County	5,867	1,038	173.86	168.72	1.03	157.07	0.325
Fulton County	6,711	1,225	182.54	158.73	1.15	175.19	0.001
Genesee County	3,595	484	134.62	159.37	0.84	128.68	0.001
Greene County	1,545	228	148.22	153.93	0.96	146.68	0.567
Herkimer County	5,307	818	154.32	158.88	0.96	146.86	0.303
Jefferson County	11,774	2,454	208.43	161.36	1.29	186.78	0.001
Kings County	858,304	144,812	150.86	144.75	1.04	158.87	0.001
Lewis County	1,118	224	200.72	163.77	1.23	186.71	0.002
Livingston County	2,642	388	151.02	161.15	0.84	142.77	0.195
Madison County	5,073	630	124.18	146.58	0.85	128.09	0.001
Monroe County	111,524	8,434	75.62	151.17	0.50	76.21	0.001
Montgomery County	6,112	1,447	236.75	156.88	1.51	228.84	0.001
Nassau County	62,243	9,825	157.85	152.58	1.03	157.58	0.001
New York County	505,649	83,811	165.53	165.33	1.12	170.85	0.001
Niagara County	44,097	6,850	157.61	161.73	0.97	148.46	0.031
Oneida County	37,588	4,328	115.14	161.85	0.71	108.32	0.001
Onondaga County	58,379	6,050	101.88	148.46	0.68	103.86	0.001
Ontario County	6,223	733	117.78	158.84	0.74	112.80	0.001
Orange County	32,073	4,739	147.76	146.47	1.01	153.88	0.547
Orleans County	4,456	628	140.83	154.88	0.81	138.63	0.018
Oswego County	11,310	1,388	123.61	153.61	0.81	122.67	0.001
Otsego County	2,438	484	180.48	165.26	1.15	175.58	0.002
Putnam County	1,825	503	275.62	162.81	1.68	257.74	0.001
Queens County	321,951	52,037	161.63	155.42	1.04	158.43	0.001
Rensselaer County	14,666	1,958	133.37	167.38	0.85	129.12	0.001
Richmond County	46,810	8,508	181.78	153.33	1.19	180.61	0.001
Rockland County	28,453	4,301	162.59	147.61	1.10	167.92	0.001
Saratoga County	5,378	976	181.48	155.93	1.16	177.30	0.001
Schenectady County	18,010	2,568	135.14	158.78	0.86	131.32	0.001
Schoharie County	2,092	223	106.60	163.00	0.65	88.83	0.001
Schuyler County	1,245	262	210.44	160.93	1.31	188.22	0.001
Seneca County	1,998	252	126.25	152.17	0.83	126.40	0.001
St. Lawrence County	15,788	2,268	143.53	[illegible]	[illegible]	[illegible]	[illegible]

Table D.4, Continued

Within Medicaid Variation by County
All Nonpregnancy-related Admissions, New York, 1985-1986

Geographic Area	Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif Level c/
Steuben County	10,818	1,815	166.22	161.02	1.03	157.27	0.175
Suffolk County	109,837	14,360	130.98	145.59	0.90	137.06	0.001
Sullivan County	5,381	1,051	184.95	155.02	1.28	191.58	0.001
Tioga County	3,355	235	70.04	155.95	0.45	88.47	0.001
Tompkins County	8,402	907	141.87	159.82	0.88	135.90	0.001
Ulster County	12,331	2,182	175.33	158.88	1.11	188.35	0.001
Warren County	4,377	815	208.05	155.38	1.35	204.88	0.001
Washington County	4,715	687	145.71	153.32	0.95	144.78	0.182
Wayne County	3,888	727	181.84	158.73	1.15	174.52	0.001
Westchester County	103,278	18,308	186.87	158.84	1.18	181.50	0.001
Wyoming County	1,357	301	221.81	165.84	1.34	203.78	0.001
Yates County	2,075	264	127.23	148.47	0.87	132.33	0.022

a/ The expected rate is the rate expected in the county Medicaid population if it had the same age and sex-specific utilization pattern as the statewide Medicaid population.

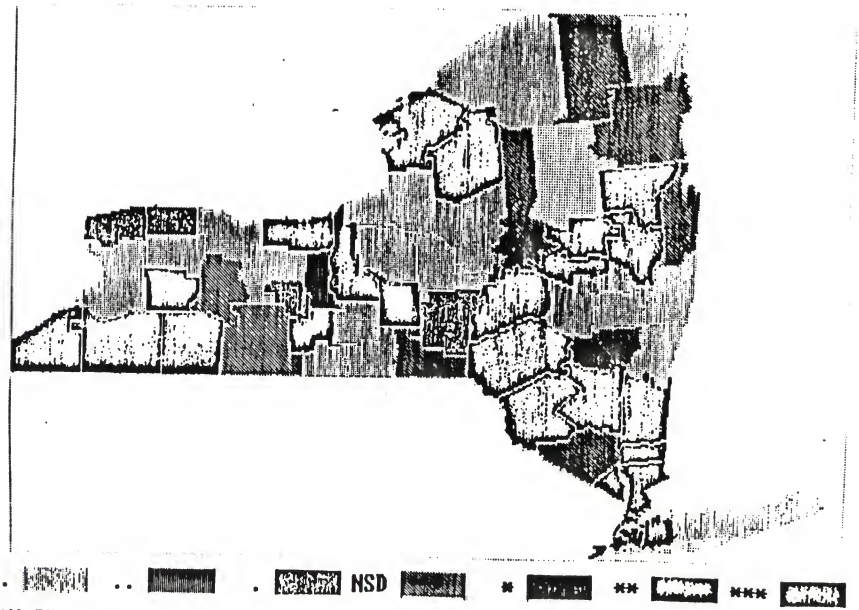
b/ The adjusted rate represents the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization.

c/ Statistical significance level of the difference between the observed and expected rates.

NOTE: All analyses are based on the population under age 65.

Figure D.6

Within-Medicaid Observed Versus Expected Rates by County:
All Nonpregnancy-related Admissions, New York, 1985-1986.



Medicaid populations are not included in the numerator or denominator of the rates for such counties.

New York counties with higher-than-expected rates for all admissions were concentrated in a number of regions, including parts of New York City (Bronx, Kings, Queens, and Richmond Counties) and suburban Nassau, Westchester, and Rockland Counties. By contrast, a number of other major urban counties displayed rates which were lower than or not significantly different from their expected rates: Albany, Erie (Buffalo), Monroe (Rochester), Onondaga (Syracuse), and Oneida (Utica/Rome). Several scattered rural areas displayed higher-than-expected admission rates: six northern counties (Fulton, Jefferson, Lewis, Montgomery, Saratoga, and Warren); four western counties (Allegany, Cattaraugus, Chautauqua, and Schuyler), three central counties (Cayuga, Cortland,, and Wayne); and six mid-Hudson counties (Delaware, Dutchess, Otsego, Putnam, Sullivan, and Ulster). The remaining rural counties had rates that were either lower than or not statistically different from their expected rates. Overall, the range of variation in adjusted rates for all admissions was nearly fourfold, from 68 per 1,000 person-years of Medicaid enrollment in Tioga County to 258 per 1,000 in Putnam County.

Table D.5 and Figure D.7 present data for all nonpregnancy related medical conditions. The data for all medical admissions display a similar pattern to that seen for all admissions. Medical admissions in New York State comprised roughly 60 percent of all nonpregnancy related Medicaid admissions, compared to

Table D.5

Within Medicaid Variation by County
All Medical Admissions, New York 1985-1986

Geographic Area	Enrollment	Number Of Cases	Observed Rate	Expected Rate 4/	Obs/Exp Ratio	Adjusted Rate 4/	Signif. Level 4/
Total New York	3,896,271	352,876	90.52	90.52	1.00	80.52	1.000
Albany County	26,288	2,002	76.13	88.80	0.86	77.77	0.001
Allegany County	4,137	478	115.54	94.81	1.22	110.31	0.001
Bronx County	898,200	87,868	97.48	86.45	1.13	102.07	0.001
Broome County	20,906	1,863	89.11	96.26	0.93	83.79	0.001
Cattaraugus County	10,013	1,135	113.35	94.99	1.19	108.01	0.001
Cayuga County	8,828	816	92.43	92.79	1.00	90.17	0.812
Chautauqua County	20,482	2,266	110.68	92.07	1.20	108.91	0.001
Chemung County	18,313	1,184	65.20	93.20	0.70	63.32	0.001
Chenango County	4,243	389	91.68	93.92	0.98	88.38	0.634
Clinton County	6,584	580	88.09	97.67	0.90	81.84	0.013
Columbia County	4,656	324	69.59	95.38	0.81	73.77	0.001
Cortland County	6,285	803	127.56	96.47	1.32	119.70	0.001
Delaware County	2,849	435	152.69	92.41	1.65	149.55	0.001
Dutchess County	15,263	1,486	98.01	91.66	1.07	96.80	0.008
Erie County	202,385	13,489	66.70	93.12	0.72	64.83	0.001
Essex County	4,894	509	104.44	93.14	1.16	105.38	0.001
Franklin County	5,967	613	102.73	97.63	1.05	95.25	0.207
Fulton County	6,711	843	125.61	93.92	1.34	121.06	0.001
Genesee County	3,595	351	97.64	94.82	1.03	93.21	0.583
Greene County	1,545	156	100.97	92.76	1.09	98.53	0.289
Herkimer County	5,307	512	96.49	94.59	1.02	92.32	0.655
Jefferson County	11,774	1,330	112.96	94.27	1.20	109.47	0.001
Kings County	959,304	88,028	92.80	97.10	1.07	96.44	0.001
Lewis County	1,116	158	141.59	96.68	1.46	132.54	0.001
Livingston County	2,642	244	92.35	94.83	0.97	88.15	0.678
Madison County	5,073	445	87.72	98.49	0.89	89.73	0.854
Monroe County	111,524	4,788	43.03	89.36	0.48	43.59	0.001
Montgomery County	6,112	1,003	164.10	93.71	1.76	158.50	0.001
Nassau County	82,243	5,620	90.29	99.93	1.00	90.88	0.761
New York County	505,648	52,984	104.59	97.18	1.08	97.41	0.001
Niagara County	44,087	3,658	82.95	93.25	0.89	80.52	0.001
Oneida County	37,588	2,435	64.79	94.83	0.68	61.83	0.001
Onondaga County	59,379	3,694	62.21	89.71	0.69	62.77	0.001
Ontario County	6,223	417	67.01	92.51	0.72	65.57	0.001
Orange County	32,073	3,125	97.43	88.41	1.10	98.75	0.001
Orleans County	4,456	391	87.78	92.54	0.95	85.83	0.283
Oswego County	11,310	814	71.97	90.89	0.79	71.68	0.001
Otsego County	2,438	279	114.53	96.89	1.18	107.00	0.005
Putnam County	1,825	251	137.53	95.03	1.49	131.00	0.001
Queens County	321,851	30,581	94.92	92.35	1.03	93.04	0.001
Rensselaer County	14,868	1,213	82.71	93.19	0.89	80.35	0.001
Richmond County	48,810	5,161	110.28	90.71	1.22	110.02	0.001
Rockland County	28,453	2,013	76.10	88.81	0.86	77.48	0.001
Saratoga County	5,378	578	107.68	93.04	1.16	104.74	0.001
Schenectady County	18,010	1,542	81.12	92.10	0.88	78.72	0.001
Schoharie County	2,092	127	60.71	95.97	0.63	57.26	0.001
Schuyler County	1,245	185	149.59	94.92	1.57	142.30	0.001
Seneca County	1,898	177	96.68	81.29	0.87	87.86	0.703
St. Lawrence County	15,788	1,402	88.80	94.54	0.94	85.03	0.018

Table D.5, Continued

Within Medicaid Variation by County
All Medical Admissions, New York 1985-1988

Geographic Area	Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
Steuben County	10,819	1,147	105.05	93.45	1.12	101.75	0.001
Suffolk County	109,837	8,990	92.00	97.35	0.94	94.97	0.001
Sullivan County	5,391	695	129.92	94.41	1.37	123.60	0.001
Tioga County	3,355	135	40.24	91.92	0.44	39.67	0.001
Tompkins County	6,402	499	76.23	91.63	0.83	75.30	0.001
Ulster County	12,331	1,172	95.05	93.62	1.02	91.90	0.604
Warren County	4,377	458	104.64	92.59	1.13	102.31	0.009
Washington County	4,715	372	78.90	82.21	0.96	77.44	0.003
Wayne County	3,998	511	127.91	93.94	1.36	123.16	0.001
Westchester County	103,276	9,536	92.34	92.40	1.00	90.45	0.948
Wyoming County	1,357	212	156.23	97.24	1.61	145.43	0.001
Yates County	2,075	179	95.78	86.91	0.98	99.44	0.874

a/ The expected rate is the rate expected in the county Medicaid population if it had the same age and sex-specific utilization pattern as the statewide Medicaid population.

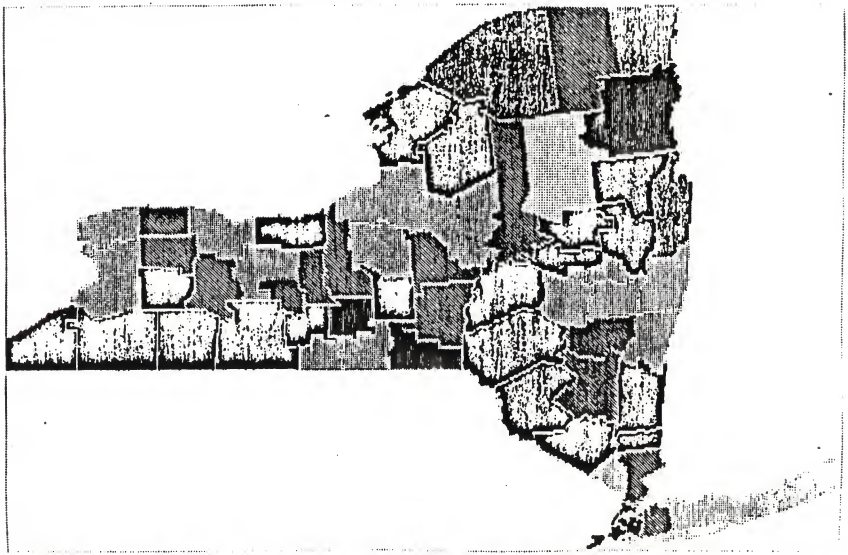
b/ The adjusted rate represents the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization.

c/ Statistical significance level of the difference between the observed and expected rates.

NOTE: All analyses are based on the population under age 65.

Figure D.7

Within-Medicaid Observed Versus Expected Rates by County:
All Medical Admissions, New York 1985-1986.



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22 percent for surgical admissions and 17 percent for psychiatric admissions. The range of variation among New York counties was fourfold, from 40 per 1,000 in Tioga County to 159 per 1,000 in Montgomery County.

Table D.6 presents the county-level data of all nonpregnancy related surgical conditions, with Figure D.8 displaying the map. Rates for all surgical admissions varied approximately threefold across New York counties, from 19 per 1,000 in Tioga County to 57 per 1,000 in Delaware County, or from 0.55 times expected to 1.67 times expected. There were large clusters of upstate counties with higher-than-expected admission rates for surgical admissions. By contrast, only two downstate counties displayed higher-than-expected rates: New York and Bronx. Most downstate counties had rates which were low or not significantly different from their expected rates, ranging from just 2 percent above expected in Queens County to 0.94 of expected in Westchester County.

Table D.7 presents the New York data for all psychiatric admissions and Figure D.9 displays the corresponding map. A substantial proportion of New York's Medicaid psychiatric admissions were concentrated in the downstate region around New York City. Upstate urban areas had consistently lower-than-expected psychiatric admission rates. Only Bronx County showed an admission rate that was not significantly different from the expected rate. Furthermore, among the few scattered upstate rural counties that had higher-than-expected admission rates, most had a relatively low volume of Medicaid

Table D.6

Within Medicaid Variation by County
All Surgical Admissions, New York 1985-1986

Geographic Area	Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
Total New York	3,898,271	133,079	34.16	34.16	1.00	34.16	1.000
Albany County	26,288	846	32.17	33.24	0.87	33.05	0.339
Allegany County	4,137	209	50.52	34.91	1.45	49.43	0.001
Bronx County	698,200	23,683	33.99	32.99	1.03	35.19	0.001
Broome County	20,906	697	32.96	35.95	0.91	31.22	0.018
Cattaraugus County	10,013	455	45.44	34.96	1.30	44.39	0.001
Cayuga County	8,828	365	41.35	34.67	1.19	40.73	0.001
Chautauqua County	20,492	972	42.55	34.48	1.23	42.15	0.001
Chemung County	18,313	722	39.43	34.62	1.14	39.99	0.001
Chenango County	4,243	195	45.96	34.03	1.35	46.13	0.001
Clinton County	6,584	209	31.74	36.53	0.87	29.68	0.042
Columbia County	4,658	147	31.57	32.09	0.98	33.61	0.944
Cortland County	6,295	191	28.75	35.43	0.91	27.72	0.005
Delaware County	2,849	163	57.21	34.33	1.67	56.92	0.001
Dutchess County	15,263	608	39.90	34.07	1.17	40.00	0.001
Erie County	202,385	6,893	34.50	35.24	0.98	33.44	0.078
Essex County	4,684	126	26.84	34.38	0.78	26.66	0.005
Franklin County	5,867	330	55.30	36.31	1.52	52.02	0.001
Fulton County	6,711	251	37.40	34.51	1.08	37.02	0.202
Genesee County	3,595	99	27.54	34.88	0.78	26.96	0.018
Greene County	1,545	55	35.60	34.36	1.04	35.39	0.783
Herkimer County	5,307	241	45.41	34.85	1.30	44.50	0.001
Jefferson County	11,774	476	40.43	34.68	1.17	39.80	0.001
Kings County	859,304	30,988	32.30	33.01	0.98	33.42	0.001
Lewis County	1,116	45	40.32	35.06	1.15	39.28	0.348
Livingston County	2,642	123	46.56	35.53	1.31	44.76	0.003
Madison County	5,073	163	32.13	32.70	0.98	33.56	0.822
Monroe County	111,524	2,359	21.15	33.38	0.63	21.64	0.001
Montgomery County	6,112	279	45.65	34.63	1.32	45.02	0.001
Nassau County	82,243	1,955	31.41	34.78	0.90	30.96	0.001
New York County	505,648	18,777	39.11	36.44	1.07	38.68	0.001
Niagara County	44,097	1,395	31.63	35.06	0.90	30.92	0.001
Oneida County	37,598	1,458	38.74	35.07	1.10	37.72	0.001
Onondaga County	59,379	1,676	29.23	33.09	0.88	29.14	0.001
Ontario County	6,223	201	32.30	35.36	0.91	31.20	0.200
Orange County	32,073	1,011	31.52	32.36	0.97	33.27	0.404
Orleans County	4,456	150	33.66	33.76	1.00	34.06	0.972
Oswego County	11,310	345	30.50	33.49	0.91	31.11	0.082
Otsego County	2,436	117	48.03	35.83	1.34	45.79	0.001
Putnam County	1,825	109	59.73	36.81	1.62	55.26	0.001
Queens County	321,851	11,512	35.76	35.07	1.02	34.82	0.038
Rensselaer County	14,666	496	33.82	34.77	0.97	33.22	0.537
Richmond County	48,810	1,350	28.84	34.40	0.84	29.83	0.001
Rockland County	26,453	799	30.17	31.87	0.94	32.23	0.100
Saratoga County	5,379	205	38.12	34.94	1.09	37.26	0.213
Schenectady County	19,010	599	31.51	34.74	0.91	30.99	0.017
Schoharie County	2,092	73	34.89	35.33	0.99	33.74	0.916
Schuyler County	1,245	65	52.21	35.11	1.49	50.76	0.001
Seneca County	1,898	53	28.55	33.72	0.79	28.99	0.081
St. Lawrence County	15,789	712	45.10	34.89	1.29	44.16	0.001

Table D.6, Continued

Within Medicaid Variation by County
All Surgical Admissions, New York 1985-1986

Geographic Area	Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
Steuben County	10,819	411	37.84	34.87	1.08	36.76	0.136
Suffolk County	106,637	3,601	32.84	33.23	0.98	33.78	0.488
Sullivan County	5,381	151	28.01	34.25	0.82	27.84	0.013
Tioga County	3,386	63	18.79	34.01	0.55	19.96	0.001
Tompkins County	6,402	203	31.71	34.71	0.91	31.20	0.187
Ulster County	12,331	819	42.01	35.12	1.20	40.86	0.001
Warren County	4,377	200	45.68	34.78	1.31	44.96	0.001
Washington County	4,715	179	37.96	34.21	1.11	37.90	0.164
Wayne County	3,868	176	44.52	34.82	1.28	43.93	0.001
Westchester County	103,276	3,421	33.12	35.07	0.94	32.26	0.001
Wyoming County	1,357	75	55.27	35.90	1.54	52.73	0.001
Yates County	2,075	64	30.84	32.83	0.94	31.98	0.600

a/ The expected rate is the rate expected is the county Medicaid population if it had the same age and sex-specific utilization pattern as the statewide Medicaid population.

b/ The adjusted rate represents the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization.

c/ Statistical significance level of the difference between the observed and expected rates.

NOTE: All analyses are based on the population under age 65.

Figure D.8

Within-Medicaid Observed Versus Expected Rates by County:
All Surgical Admissions, New York 1985-1986.

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Table D.7

Within Medicaid Variation by County
All Psychiatric Admissions, New York 1985-1986

Geographic Area	Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
Total New York	3,898,271	101,541	26.06	26.06	1.00	26.06	1.000
Albany County	26,288	576	21.90	23.81	0.92	23.87	0.045
Allegany County	4,137	54	13.06	31.27	0.42	10.88	0.001
Bronx County	698,200	15,821	22.72	22.62	1.00	26.18	0.578
Broome County	20,806	841	40.23	30.24	1.33	34.67	0.001
Cattaraugus County	10,013	241	24.07	30.71	0.78	20.42	0.001
Cayuga County	8,828	337	38.17	30.08	1.27	33.07	0.001
Chautauqua County	20,482	300	14.64	30.15	0.49	12.65	0.001
Chemung County	18,313	126	6.88	30.21	0.23	5.94	0.001
Chenango County	4,243	23	5.42	27.53	0.20	5.13	0.001
Clinton County	8,584	128	18.44	32.54	0.60	15.57	0.001
Columbia County	4,658	50	10.74	23.89	0.45	11.71	0.001
Cortland County	6,295	152	24.15	31.33	0.77	20.08	0.001
Delaware County	2,849	48	16.85	28.04	0.60	15.66	0.001
Dutchess County	15,253	406	26.60	24.97	1.07	27.76	0.202
Erie County	202,385	4,535	22.41	30.66	0.73	18.92	0.001
Essex County	4,694	72	15.34	28.62	0.54	13.97	0.001
Franklin County	5,867	89	14.92	32.99	0.45	11.78	0.001
Fulton County	6,711	121	18.03	28.64	0.63	16.41	0.001
Genesee County	3,595	33	9.18	27.99	0.33	8.55	0.001
Greene County	1,545	16	10.36	25.19	0.41	10.71	0.001
Herkimer County	5,307	60	11.31	28.85	0.39	10.21	0.001
Jefferson County	11,774	639	54.27	30.71	1.77	46.05	0.001
Kings County	859,304	23,400	24.39	23.12	1.06	27.50	0.001
Lewis County	1,116	19	17.03	30.30	0.56	14.64	0.011
Livingston County	2,642	28	10.60	29.09	0.36	9.49	0.001
Madison County	5,073	18	3.55	23.88	0.15	3.88	0.001
Monroe County	111,524	1,149	10.30	28.85	0.38	10.00	0.001
Montgomery County	6,112	155	25.36	26.86	0.94	24.80	0.474
Nassau County	62,243	2,130	34.22	26.28	1.30	33.94	0.001
New York County	505,648	20,125	39.80	29.83	1.33	34.66	0.001
Niagara County	44,087	1,851	41.88	31.72	1.32	34.49	0.001
Oneida County	37,588	388	10.32	30.33	0.34	8.87	0.001
Onondaga County	58,378	609	10.26	25.12	0.41	10.64	0.001
Ontario County	8,223	110	17.88	29.37	0.60	15.68	0.001
Orange County	32,073	553	17.24	24.19	0.71	18.58	0.001
Orleans County	4,458	78	17.73	26.96	0.66	17.14	0.001
Oswego County	11,310	227	20.07	27.54	0.73	18.99	0.001
Otsego County	2,436	65	26.68	30.80	0.87	22.58	0.247
Putnam County	1,825	140	76.71	29.21	2.63	68.44	0.001
Queens County	321,851	8,417	26.25	26.34	1.11	28.94	0.001
Rensselaer County	14,666	220	15.00	27.75	0.54	14.08	0.001
Richmond County	46,810	1,819	41.00	26.58	1.54	40.18	0.001
Rockland County	26,453	1,448	54.78	25.12	2.18	56.82	0.001
Saratoga County	5,378	185	34.40	26.30	1.31	34.08	0.001
Schenectady County	19,010	401	21.09	28.28	0.75	19.44	0.001
Schoharie County	2,092	21	10.04	28.87	0.33	8.73	0.001
Schuyler County	1,245	11	8.84	29.59	0.30	7.78	0.001
Seneca County	1,898	21	10.52	25.60	0.41	10.71	0.001
St. Lawrence County	15,788	140	8.87	31.79	0.28	7.27	0.001

Table D.7, Continued

Within Medicaid Variation by County
All Psychiatric Admissions, New York 1985-1986

Geographic Area	Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
Steuben County	10,819	244	22.39	30.88	0.72	19.85	0.001
Suffolk County	108,837	1,593	14.53	23.47	0.62	16.13	0.001
Sullivan County	5,381	196	36.36	24.74	1.47	38.30	0.001
Tioga County	3,355	36	10.73	28.38	0.38	9.85	0.001
Tompkins County	8,402	197	30.77	30.80	1.00	26.04	0.988
Ulster County	12,331	461	37.39	28.25	1.32	34.49	0.001
Warren County	4,377	251	57.35	26.37	2.17	56.67	0.001
Washington County	4,715	127	26.84	25.28	1.07	27.77	0.475
Wayne County	3,888	32	8.00	28.51	0.28	7.32	0.001
Westchester County	103,276	5,158	50.63	27.80	2.14	55.80	0.001
Wyoming County	1,357	8	6.63	31.04	0.21	5.57	0.001
Yates County	2,075	16	7.71	25.18	0.31	7.88	0.001

a/ The expected rate is the rate expected in the county Medicaid population if it had the same age and sex-specific utilization pattern as the statewide Medicaid population.

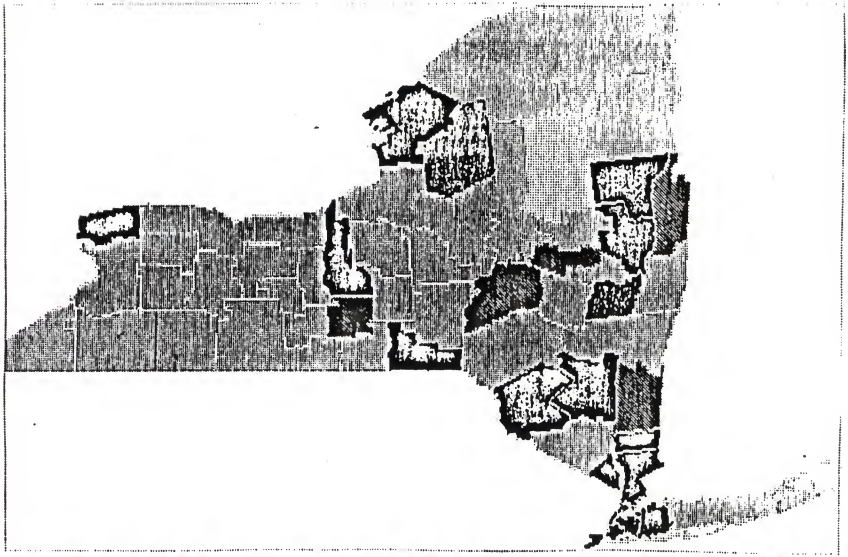
b/ The adjusted rate represents the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization.

c/ Statistical significance level of the difference between the observed and expected rates.

NOTE: All analyses are based on the population under age 65.

Figure D.9

Within-Medicaid Observed Versus Expected Rates by County:
All Psychiatric Admissions, New York 1985-1986.



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admissions. By contrast, most of the other upstate counties, including major population centers (Albany/Schenectady, Buffalo, Rochester, Syracuse, Utica/Rome) had rates that were lower than expected. Overall, the range of variation among New York counties was more than 17-fold, ranging from 3.88 per 1,000 in Madison County to 68.44 per 1,000 in Putnam County.

In summary, admission rates in New York's Medicaid population were consistently higher than expected in the most urbanized and populous downstate counties: Kings, Bronx, New York, and Queens. By contrast, populous upstate counties (Erie, Monroe, Albany) were lower than expected. The remaining, largely rural counties displayed the full range of variation in admission rates.

Mental health and substance abuse (major diagnostic categories [MDCs] 19 and 20) together accounted for 17 percent of all nonpregnancy related admissions statewide. As in California, medical admissions accounted for 72 percent of all admissions (excluding MDCs 19 and 20) in downstate urban counties. By contrast, upstate populous counties showed medical admissions accounting for roughly 65 percent of all admissions. Large clusters of upstate counties also showed higher-than-expected surgical admission rates. By contrast, only two downstate counties displayed higher-than-expected rates: New York and Bronx. Most downstate counties had rates which were low or not significantly different from their expected rates.

Admission rates for all psychiatric admissions (MDCs 19 and 20) among Medicaid populations in New York counties paralleled

the patterns seen for all admissions: urbanized, populous downstate counties were consistently above the State Medicaid average and populous upstate counties were below the statewide average.

We also generated tables and maps describing Medicaid utilization patterns for hospital market areas within the following urban settings: New York City, Albany, Buffalo, and Rochester. The large volume of data precluded presenting this data here, but these data can be obtained from the Health Care Financing Administration's Office of Research and Demonstrations.

D.4. IOWA (1985-1987)

Table D.8 presents utilization data for all admissions in Iowa. (Note that geographic areas in Iowa are based on clusters of hospital market areas that only approximate county boundaries, so county-level maps are not presented for this State.) In southeastern Iowa, the rates in Clinton, Cedar Rapids-North, and Cedar Rapids-South were high, while those in Davenport-West, Dubuque, and Cedar Falls were low, relative to their expected rates. The range was from 80 per 1,000 person-years of Medicaid enrollment in La Porte City to 167 per 1,000 in Cedar Rapids-South.

All medical admissions present a similar pattern (see Table D.9), with a twofold range in admission rates between the highest area (Cedar Rapids-North, at 86 per 1,000) and the lowest

Table D.8

Within Medicaid Variation by County
All Nonpregnancy-related Admissions, Iowa, 1985-1987

Geographic Area	Medicaid Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
Total Iowa	515,142	67,736	131.48	134.56	0.977	131.48	0.001
Boone	12,380	1,842	137.57	135.84	1.012	136.17	0.810
Burlington	11,168	1,550	138.78	134.28	1.033	138.06	0.195
Cedar Falls	6,505	576	88.55	130.86	0.678	81.18	0.001
Cedar Rapids - North	14,834	2,376	160.17	133.32	1.201	161.67	0.001
Cedar Rapids - South	17,655	2,929	165.80	132.87	1.248	167.88	0.001
Clarinda	13,818	1,467	105.40	136.58	0.772	103.83	0.001
Clinton	10,877	1,584	146.55	131.80	1.111	149.50	0.001
Council Bluffs - Northwest	16,146	2,702	167.35	133.08	1.257	169.20	0.001
Council Bluffs - Southeast	17,041	1,638	96.12	140.35	0.685	92.18	0.001
Davenport - East	14,588	1,906	130.66	129.97	1.005	135.26	0.919
Davenport - West	27,189	3,302	121.40	130.58	0.930	125.10	0.001
Denison	10,331	836	80.60	138.50	0.654	88.02	0.001
Des Moines - Central	15,223	2,641	173.49	136.63	1.270	170.86	0.001
Des Moines - North	23,488	3,851	164.10	133.03	1.234	165.98	0.001
Des Moines - Southwest	26,416	4,103	155.32	133.27	1.165	158.93	0.001
Des Moines - Southeast	16,592	2,303	138.80	133.07	1.043	140.36	0.043
Dubuque	24,880	2,804	112.78	134.53	0.838	112.82	0.001
Fort Dodge	11,034	1,457	132.05	136.17	0.970	130.48	0.240
Iowa City	15,855	1,785	110.62	134.23	0.824	110.80	0.001
Keokuk	17,683	2,508	141.88	134.12	1.058	142.35	0.005
Manchester	12,281	1,308	106.18	134.08	0.792	108.55	0.001
Marshalltown	20,028	2,332	116.43	135.92	0.857	115.35	0.001
Mason City	10,613	1,570	147.93	138.67	1.058	142.52	0.023
Muscatine	8,490	705	83.04	129.78	0.640	86.09	0.001
Oskaloosa	20,060	2,891	143.62	138.77	1.035	139.26	0.065
Ottumwa	12,348	1,651	133.71	137.00	0.976	131.32	0.323
Sioux City - South	20,183	3,145	155.75	134.32	1.160	156.02	0.001
Sioux City - North	14,742	1,815	123.12	135.60	0.908	122.17	0.001
Spencer	18,295	2,260	123.60	137.51	0.898	120.84	0.001
Vinton	3,478	393	112.96	136.15	0.830	111.65	0.001
Waterloo - Northeast	19,478	2,415	123.99	132.44	0.936	125.97	0.001
Waterloo - Southwest	14,831	1,693	116.03	133.95	0.859	115.55	0.001
Waverly	15,511	1,330	86.76	138.02	0.630	84.92	0.001

a/ The expected rate is the rate expected in the county Medicaid population if it had the same age and sex-specific utilization pattern as the statewide Medicaid population.

b/ The adjusted rate represents the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization.

c/ Statistical significance level of the difference between the observed and expected rates.

NOTE: All analyses are based on the population under age 65.

Table D.9

Within - Medicaid Variation by HMA Cluster:
All Medical Admissions, Iowa 1988-1987

Geographic Area	Medicaid Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
Total Iowa	515,142	33,816	65.84	67.25	0.878	65.84	0.001
Boone	13,380	1,068	78.84	68.27	1.168	78.84	0.001
Burlington	11,168	827	74.05	66.63	1.111	74.74	0.002
Cedar Falls	8,505	272	41.81	64.75	0.646	43.42	0.001
Cedar Rapids - North	14,824	1,234	83.18	65.82	1.262	84.88	0.001
Cedar Rapids - South	17,655	1,458	82.58	65.68	1.257	84.55	0.001
Clarinda	13,818	685	48.83	68.05	0.723	48.83	0.001
Clinton	10,877	876	80.54	64.06	1.257	84.55	0.001
Council Bluffs - Northwest	18,148	1,468	90.82	67.83	1.340	90.13	0.001
Council Bluffs - Southwest	17,041	843	55.34	70.17	0.788	53.03	0.001
Davenport - East	14,588	1,015	68.58	65.28	1.066	71.68	0.042
Davenport - West	27,188	1,814	58.34	64.84	0.815	61.55	0.001
Denison	10,331	485	46.85	68.10	0.688	46.36	0.001
Des Moines - Central	15,223	1,335	87.70	70.02	1.253	84.23	0.001
Des Moines - North	23,468	1,848	83.05	67.74	1.226	82.44	0.001
Des Moines - Southwest	26,416	2,028	76.81	66.58	1.153	77.57	0.001
Des Moines - Southeast	18,582	1,111	66.96	66.48	1.007	67.73	0.813
Dubuque	24,850	1,261	50.72	65.84	0.781	51.18	0.001
Fort Dodge	11,034	635	57.58	68.30	0.843	56.66	0.001
Iowa City	15,855	805	50.45	66.51	0.758	51.01	0.001
Keokuk	17,683	1,415	80.02	67.24	1.180	80.03	0.001
Manchester	12,281	665	54.10	66.36	0.815	54.83	0.001
Marshalltown	20,028	1,018	50.88	67.65	0.752	50.57	0.001
Mason City	10,813	763	71.88	68.21	1.038	68.85	0.284
Muscatine	8,490	343	40.40	65.41	0.618	41.54	0.001
Oskaloosa	20,060	1,653	82.40	68.71	1.182	78.48	0.001
Ottumwa	12,348	814	74.02	68.00	1.088	73.20	0.010
Sioux City - South	20,193	1,361	67.40	68.67	0.881	68.00	0.488
Sioux City - North	14,742	710	48.16	67.66	0.712	47.87	0.001
Spencer	18,285	984	52.72	68.47	0.770	51.78	0.001
Vinton	3,478	228	64.86	68.68	0.846	63.60	0.402
Waterloo - Northeast	18,478	1,312	67.36	66.06	1.020	68.58	0.477
Waterloo - Southwest	14,631	834	57.00	65.84	0.864	58.13	0:001
Waverly	15,511	658	42.28	67.88	0.623	41.80	0.001

a/ The expected rate is the rate expected in the county Medicaid population if it had the same age and sex-specific utilization patters as the statewide Medicaid population.

b/ The adjusted rate represents the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization.

c/ Statistical significance level of the difference between the observed and expected rates.

NOTE: All analyses are based on the population under age 65.

(La Porte City, at 40 per 1,000).

Table D.10 presents Iowa data for nonpregnancy related surgical conditions. The range of rates for surgical admissions was somewhat narrower (less than twofold), and fewer areas recorded rates that differed significantly from their expected rates. Medicaid residents of the Washington area had the highest admission rate--44 percent above expected--although its rate for all admissions was 10 percent below expected. Cedar Rapids-North, Independence, and Grinnell also had above-average admission rates for surgical procedures. Low admission rates in Cedar Falls, Dubuque, Davenport-East, and Davenport-West were consistent with the pattern for all admissions.

Iowa's pattern for all psychiatric admissions displayed considerably greater variation (see Table D.11), with a 5.8-fold range between the highest rate (52 per 1,000 in Sioux City-South) and the lowest rate (nine per 1,000 in Waverly). Higher-than-expected rates were also observed in Sioux City-North, Cedar Rapids (both North and South), and Mason City. Lower-than-expected rates were also found in Muscatine, Denison, Manchester, and Council Bluffs-Southeast.

In summary, a number of Iowa small areas established consistent patterns. Across most of the conditions, the areas of Clinton, Cedar Rapids-North, and Cedar Rapids-South had significantly high rates, and Dubuque and Iowa City had significantly low rates.

Additional data were generated for small hospital market areas in Des Moines and the Southeast region of the State, and

Table D.10

Within - Medicaid Variation by HMA Cluster:
All Surgical Admissions, Iowa 1985-1987

Geographic Area	Medicaid Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
Total Iowa	515,142	17,210	33.41	34.08	0.980	33.41	0.008
Boone	13,390	451	33.68	34.50	0.976	33.27	0.609
Burlington	11,168	381	35.01	33.94	1.032	35.15	0.538
Cedar Falls	5,505	173	25.59	33.54	0.763	27.02	0.002
Cedar Rapids - North	14,834	567	38.22	33.94	1.126	38.38	0.005
Cedar Rapids - South	17,855	642	36.36	33.76	1.076	36.68	0.062
Clarinda	13,618	413	28.87	34.60	0.857	28.22	0.002
Clinton	10,877	374	34.38	34.02	1.011	34.44	0.836
Council Bluffs - Northwest	16,148	536	33.20	33.55	0.990	33.72	0.808
Council Bluffs - Southeast	17,041	388	23.41	35.06	0.667	22.74	0.001
Davenport - East	14,588	431	29.54	33.21	0.890	30.32	0.015
Davenport - West	27,199	798	29.27	33.20	0.881	30.04	0.001
Denison	10,331	266	25.75	34.98	0.737	25.10	0.001
Des Moines - Central	15,223	526	34.55	34.11	1.013	34.52	0.788
Des Moines - North	23,468	955	40.69	33.52	1.203	41.01	0.001
Des Moines - Southwest	25,416	957	37.36	33.77	1.106	37.71	0.001
Des Moines - Southeast	15,582	567	34.17	33.52	1.017	34.54	0.696
Dubuque	24,850	774	31.13	34.03	0.915	31.18	0.013
Fort Dodge	11,034	465	42.14	34.31	1.228	41.86	0.001
Iowa City	15,855	555	34.79	33.97	1.024	34.89	0.577
Keokuk	17,683	634	35.85	34.02	1.054	35.82	0.185
Manchester	12,281	408	33.03	34.04	0.970	33.07	0.544
Marshalltown	20,028	709	35.40	34.21	1.035	35.28	0.364
Mason City	10,813	315	29.58	35.42	0.836	28.55	0.002
Muscatine	8,490	269	31.68	33.21	0.954	32.52	0.442
Oskaloosa	20,060	784	39.58	34.82	1.137	38.73	0.001
Ottumwa	12,348	375	30.37	34.38	0.883	30.08	0.016
Sioux City - South	20,183	733	36.30	33.92	1.070	36.47	0.066
Sioux City - North	14,742	454	30.80	34.38	0.896	30.52	0.018
Spencer	18,265	642	35.11	34.72	1.011	34.46	0.776
Vinton	3,478	101	29.03	34.43	0.843	28.74	0.086
Waterloo - Northeast	18,478	535	32.60	33.74	0.966	32.92	0.385
Waterloo - Southwest	14,831	448	30.48	34.28	0.889	30.30	0.013
Waverly	15,511	428	27.88	34.50	0.802	27.32	0.001

a/ The expected rate is the rate expected in the county Medicaid population if it had the same age and sex-specific utilization pattern as the statewide Medicaid population.

b/ The adjusted rate represents the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization.

c/ Statistical significance level of the difference between the observed and expected rates.

NOTE: All analyses are based on the population under age 65.

Table D.11

Within - Medicaid Variation by HMA Cluster:
All Psychiatric Admissions, Iowa 1985-1987

Geographic Area	Medicaid Enrollment	Number Of Cases	Observed Rate	Expected Rate a/	Obs/Exp Ratio	Adjusted Rate b/	Signif. Level c/
Total Iowa	515,142	13,341	25.90	25.84	0.965	25.90	0.001
Boone	13,380	256	18.12	25.87	0.711	18.08	0.001
Burlington	11,168	282	26.15	27.23	0.960	25.77	0.488
Cedar Falls	8,506	89	13.68	25.89	0.529	14.21	0.001
Cedar Rapids - North	14,834	518	34.92	26.83	1.297	34.80	0.001
Cedar Rapids - South	17,855	769	43.33	27.15	1.589	42.81	0.001
Clarinda	13,818	259	18.51	26.85	0.693	18.58	0.001
Clinton	10,877	277	25.47	27.49	0.925	24.86	0.203
Council Bluffs - Northwest	16,145	664	41.12	29.08	1.839	43.99	0.001
Council Bluffs - Southeast	17,041	203	11.91	28.70	0.415	11.14	0.001
Davenport - East	14,988	401	27.49	25.14	1.094	29.35	0.073
Davenport - West	27,198	783	28.79	26.00	1.107	29.71	0.004
Denison	10,331	123	11.81	26.70	0.418	11.13	0.001
Des Moines - Central	15,223	496	32.58	26.20	1.244	33.38	0.001
Des Moines - North	23,468	645	27.53	25.06	1.098	29.48	0.017
Des Moines - Southwest	28,415	772	28.22	26.41	1.107	28.70	0.005
Des Moines - Southeast	16,582	502	30.28	26.27	1.152	30.92	0.002
Dubuque	24,860	608	24.50	27.52	0.880	23.88	0.004
Fort Dodge	11,034	318	28.81	27.13	1.066	28.80	0.257
Iowa City	15,866	328	20.62	27.21	0.756	20.34	0.001
Keokuk	17,683	347	18.62	26.52	0.740	19.88	0.001
Manchester	12,281	143	11.53	27.71	0.420	11.27	0.001
Marshalltown	20,028	459	22.92	27.44	0.835	22.41	0.001
Mason City	10,813	453	42.58	28.39	1.503	40.35	0.001
Muscatine	8,480	72	8.48	24.92	0.340	9.13	0.001
Oskaloosa	20,060	261	13.01	27.85	0.466	12.49	0.001
Ottumwa	12,348	294	23.81	28.26	0.843	22.81	0.003
Sioux City - South	20,193	988	49.32	26.44	1.838	52.03	0.001
Sioux City - North	14,742	988	38.89	27.28	1.464	38.28	0.001
Spencer	18,285	545	29.81	28.09	1.061	28.47	0.167
Vinton	3,478	47	13.51	25.75	0.505	13.55	0.001
Waterloo - Northeast	19,478	370	19.00	26.38	0.721	18.34	0.001
Waterloo - Southwest	14,831	319	21.50	27.07	0.806	21.82	0.001
Waverly	15,511	144	8.28	27.42	0.338	8.09	0.001

a/ The expected rate is the rate expected in the county Medicaid population if it had the same age and sex-specific utilization pattern as the statewide Medicaid population.

b/ The adjusted rate represents the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization.

c/ Statistical significance level of the difference between the observed and expected rates.

NOTE: All analyses are based on the population under age 65.

are available from the Health Care Financing Administration's Office of Research and Demonstrations.

APPENDIX E

COUNTY-LEVEL AMBULATORY UTILIZATION TABLES AND MAPS FOR THE MEDICAID POPULATION

E.1 INTRODUCTION

In this appendix we present county-level ambulatory utilization tables and maps for the Medicaid population. Included are data for overall ambulatory utilization. As was the case in Appendix D, tables in this appendix include the following data by county: the number of Medicaid enrollees in the county; the number of services in the county; the observed rate for the Medicaid population living in the county; the rate expected if the county Medicaid population had the same age and sex-specific utilization pattern as the statewide Medicaid population; the observed to expected ratio; the adjusted rate, representing the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization (Fleiss, 1973); and the statistical significance of the difference between the observed and expected rate. A map displaying the county-level utilization patterns accompanies each table. The shading of the maps reflects the level of significance of the difference between the observed and expected rate for each county. (Keep in mind that the level of significance for a given county is a function of the size of the difference between the observed and expected rates and the size of the county population.) The terms "high" and "low" refer to geographic areas whose observed rates were significantly higher or lower than their expected rates. The discussion focuses on major urban areas, where most of the States' Medicaid enrollees reside.

Because of the volume of material, we focus here on overall ambulatory utilization. County-level tables and maps also are available for selected specific ambulatory treatments from the Health Care Financing Administration's Office of Research and Demonstrations.

E.2. CALIFORNIA (1985-86)

Figure E.1 presents an index of the county clusters used in California (Santa Barbara County is excluded from this analysis because no claims data were available from its capitated plan for outpatient Medicaid care during that period). Table E.1 presents data for overall ambulatory care by county in Medicaid, and Figure E.2 displays the corresponding map. The data reveals that among the California county clusters with significantly higher-than-expected rates were most of the major urban areas in both northern and southern California, led by the counties of San Francisco and San Diego, and including the counties of Alameda (Oakland) and Los Angeles. Also included in this list were several suburban counties surrounding San Francisco and Los Angeles. Indeed, the highest rate was registered by Marin County, north of San Francisco. Several rural areas in northern California, plus Kings County in central California, also displayed significantly high rates. However, the rest of the State, including several smaller urban and suburban areas in both northern and southern California, showed significantly lower-than-expected rates. The lowest rates were found in rural

Figure E.1
Index of County Clusters, California

Figure E.1 Continued
Index of County Clusters, California

Cluster Number	County/Cluster Name	Counties in Cluster
1	Alameda	Alameda
2	Alpine	Alpine Tuolomne
3	Amador	Amador
4	Butte	Butte
5	Calaveras	Calaveras
6	Colusa	Colusa
7	Contra Costa	Contra Costa
8	Del Norte	Del Norte
9	El Dorado	El Dorado
10	Fresno	Fresno
11	Glenn	Glenn
12	Humboldt	Humboldt
13	Imperial	Imperial
14	Inyo	Inyo Mono
15	Kern	Kern
16	Kings	Kings
17	Lake	Lake
18	Lassen	Lassen
19	Los Angeles	Los Angeles
20	Madera	Madera
21	Marin	Marin
22	Mariposa	Mariposa

Figure E.1, Continued
Index of County Clusters, California

Cluster Number	County/Cluster Name	Counties in Cluster
23	Mendocino	Mendocino
24	Merced	Merced
25	Modoc	Modoc Siskiyou
26	Monterey	Monterey
27	Napa	Napa
28	Nevada	Nevada
29	Orange	Orange
30	Placer	Placer
31	Plumas	Plumas Sierra
32	Riverside	Riverside
33	Sacramento	Sacramento
34	San Benito	San Benito
35	San Bernardino	San Bernardino
36	San Diego	San Diego
37	San Francisco	San Francisco
38	San Joaquin	San Joaquin
39	San Luis Obispo	San Luis Obispo
40	San Mateo	San Mateo
41	Santa Barbara	Santa Barbara
42	Santa Clara	Santa Clara
43	Santa Cruz	Santa Cruz

Figure E.1
Index of County Clusters, California

Cluster Number	County/Cluster Name	Counties in Cluster
44	Shasta	Shasta
45	Solano	Solano
46	Sonoma	Sonoma
47	Stanislaus	Stanislaus
48	Sutter	Sutter
49	Tehama	Tehama
50	Trinity	Trinity
51	Tulare	Tulare
52	Ventura	Ventura
53	Yolo	Yolo
54	Yuba	Yuba

Table E.1

WITHIN-MEDICAID UTILIZATION BY COUNTY CLUSTER:
OUTPATIENT TOTAL DAYS OF CARE, CALIFORNIA 1985-1988

GEOGRAPHIC AREA	MEDICAID ENROLLMENT	NUMBER OF CASES	OBSERVED RATE	EXPECTED RATE a/	OBS/EXP RATIO	ADJUSTED RATE b/	SIGNIF LEVEL c/
TOTAL CALIFORNIA	4,257,481	25,658,079	6.02	6.02	1.000	6.02	1.000
ALAMEDA	195,482	1,293,386	6.61	6.17	1.072	6.45	0.001
AMADOR	2,661	14,167	5.32	6.05	0.880	5.30	0.001
BUTTE	38,318	236,025	6.21	6.07	1.023	6.16	0.001
CALAVERAS	5,243	27,314	5.20	5.65	0.875	5.27	0.001
COLUSA	3,516	18,614	5.29	5.84	0.906	5.45	0.001
CONTRA COSTA	80,257	521,527	6.49	6.13	1.060	6.38	0.001
DEL NORTE	7,564	41,705	5.51	5.92	0.930	5.60	0.001
EL DORADO	13,878	72,365	5.21	6.02	0.865	5.21	0.001
FRESNO	204,235	1,073,484	5.25	5.83	0.901	5.43	0.001
GLENN	4,892	24,664	4.98	5.81	0.843	5.07	0.001
HUMBOLDT	30,658	188,357	6.14	6.03	1.018	6.13	0.001
IMPERIAL	31,148	158,083	5.07	5.90	0.859	5.17	0.001
INYO	4,034	20,166	4.99	6.01	0.831	5.01	0.001
KERN	99,250	498,081	5.01	5.98	0.838	5.05	0.001
KINGS	23,074	136,116	5.89	5.83	1.012	6.09	0.001
LAKE	12,814	64,935	5.06	6.12	0.828	4.98	0.001
LASSEN	5,690	39,335	6.67	6.01	1.110	6.68	0.001
LOS ANGELES	1,250,597	7,872,199	6.29	6.06	1.039	6.25	0.001
MADERA	21,369	109,083	5.10	5.89	0.865	5.21	0.001
MARIN	12,261	100,604	8.20	6.34	1.292	7.78	0.001
MARIPOSA	2,804	14,724	5.07	5.92	0.856	5.15	0.001
MENDOCINO	19,661	111,956	5.63	6.01	0.936	5.63	0.001
MERCED	58,868	303,683	5.18	5.81	0.887	5.34	0.001
MONTEREY	47,575	227,787	4.78	5.81	0.810	4.87	0.001
NAPA	11,261	70,475	6.24	6.14	1.016	6.12	0.001
NEVADA	9,637	58,460	5.85	6.04	0.970	5.84	0.001
ORANGE	156,845	1,045,698	6.67	6.06	1.101	6.63	0.001
PLACER	19,368	116,741	6.02	6.10	0.988	5.94	0.001
PLUMAS	4,095	25,332	6.18	6.06	1.016	6.12	0.012
RIVERSIDE	142,949	801,072	5.60	5.99	0.934	5.63	0.001
SACRAMENTO	250,827	1,343,232	5.35	5.87	0.897	5.40	0.001
SAN BENITO	6,031	32,854	5.46	5.79	0.942	5.67	0.001
SAN BERNARDINO	220,559	1,152,142	5.22	5.98	0.875	5.27	0.001
SAN DIEGO	278,681	1,650,336	6.03	6.03	1.100	6.03	0.001
SAN FRANCISCO	119,178	908,569	7.60	6.34	1.199	7.22	0.001
SAN JOAQUIN	152,078	915,311	6.01	5.88	1.023	6.16	0.001
SAN LUIS OBISPO	18,504	100,785	5.44	6.14	0.888	5.33	0.001
SAN MATEO	34,931	229,922	6.57	6.27	1.048	6.31	0.001
SANTA CLARA	148,583	933,217	6.27	6.02	1.041	6.27	0.001
SANTA CRUZ	26,052	174,061	6.68	6.16	1.083	6.62	0.001

Table E.1 Continued

WITHIN-MEDICAID UTILIZATION BY COUNTY CLUSTER:
OUTPATIENT TOTAL DAYS OF CARE, CALIFORNIA 1985-1986

GEOGRAPHIC AREA	MEDICAID ENROLLMENT	NUMBER OF CASES	OBSERVED RATE	EXPECTED RATE a/	OBS/EXP RATIO	ADJUSTED RATE b/	SIGNIF LEVEL c/
SHASTA	38,841	219,764	5.66	5.99	0.949	5.72	0.001
SISKIYOU	13,792	66,547	4.82	5.89	0.907	4.96	0.001
SOLANO	40,333	235,004	5.82	6.02	0.967	5.92	0.001
SONOMA	45,664	264,076	5.78	6.17	0.937	5.64	0.001
STANISLAUS	99,452	512,540	5.79	5.97	0.969	5.84	0.001
SUTTER	13,841	82,764	5.93	6.02	0.985	5.93	0.001
TEHAMA	12,140	67,599	5.56	6.00	0.927	5.58	0.001
TRINITY	3,215	17,975	5.58	5.68	0.934	5.62	0.001
TULARE	103,673	552,667	5.33	5.67	0.908	5.47	0.001
TUOLUMNE	7,851	41,296	5.18	6.00	0.866	5.21	0.001
VENTURA	67,881	417,038	6.14	5.85	1.032	6.21	0.001
YOLO	24,155	126,653	5.24	6.04	0.868	5.23	0.001
YUBA	21,672	129,141	5.95	5.98	0.885	5.99	0.075

a/ The expected rate is the rate expected in the county Medicaid population if it had the same age and sex-specific utilization pattern as the statewide Medicaid population.

b/ The adjusted rate represents the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization.

c/ Statistical significance level of the difference between the observed and expected rates.

NOTE: All analyses are based on the population under age 65.

Figure E.2

WEIGHTED OBSERVED VERSUS EXPECTED RATES
BY COUNTY CLUSTER: OUTPATIENT TOTAL UTILIZATION,
CALIFORNIA 1985-1986.

county clusters scattered throughout the State.

E.3. GEORGIA (1983-1984)

Figure E.3 presents the index of county clusters used in Georgia, Table E.2 presents the ambulatory utilization data, and Figure E.4 is the county-cluster map. Perhaps the most notable feature of this data is that most of the county clusters with significantly higher-than-expected rates were concentrated in the northeastern and southwestern corners of the State, in the east-central part of the State, and west of Atlanta. In contrast, most of the county clusters with significantly lower-than-expected rates were located in central and southern Georgia and in the northwestern and southeastern corners of the State. Most of the State's urban areas had significantly low rates, but the counties of Clarke (Athens), Cobb (Marietta), and Richmond (Augusta) had significantly high rates.

E.4. MICHIGAN (1984-1985)

Figure E.5 is the index of county clusters used in Michigan. Table E.3 presents the utilization data for each of the county clusters, and Figure E.6 is the map that displays the utilization patterns. The data reveals that the urban county clusters with significantly higher-than-expected rates included the suburban counties surrounding Detroit (but not Wayne County itself) and several port areas. The urban counties with the highest rates

Figure E.3
Index of County Clusters, Georgia

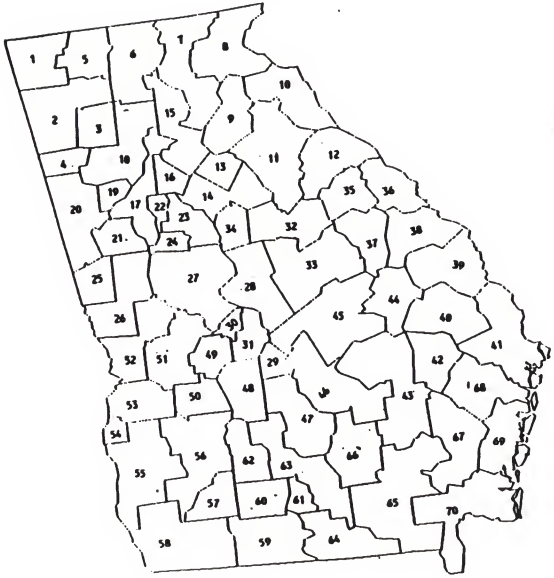

Figure E.3 Continued

Index of County Clusters, Georgia

Cluster Number	County/Cluster Name	Counties in Cluster
1	Catoosa	Catoosa Walker Dade
2	Floyd	Floyd Chattaooga Gordon
3	Bartow	Bartow
4	Polk	Polk
5	Whitefield	Whitefield Murray
6	Fannin	Fannin Gilmer Pickens
7	Hall	Hall Lumpkin Towns Union
8	Stephens	Stephens Habersham Rabun White
9	Barrow	Barrow Jackson Banks
10	Hart	Hart Franklin Elbert
11	Clarke	Clarke Madison Oconee Oglethorpe Greene
12	Wilkes	Wilkes Lincoln Taliaferro

Figure E.3 Continued
Index of County Clusters, Georgia

Cluster Number	County/Cluster Name	Counties in Cluster
13	Walton	Walton
14	Newton	Newton Morgan Rockdale
15	Gwinnett	Gwinnett Forsyth Dawson
16	DeKalb	DeKalb
17	Fulton	Fulton Fayette
18	Cobb	Cobb Paulding Cherokee
19	Douglas	Douglas
20	Carroll	Carroll Haralson Heard
21	Coweta	Coweta
22	Clayton	Clayton
23	Henry	Henry Butts
24	Spalding	Spalding
25	Troup	Troup
26	Harris	Harris Meriwether
27	Upson	Upson Pike Lamar Monroe Crawford

Figure E.3, Continued
Index of County Clusters, Georgia

Cluster Number	County/Cluster Name	Counties in Cluster
28	Bibb	Bibb Jones Twiggs
29	Pulaski	Pulaski
30	Peach	Peach
31	Houston	Houston
32	Hancock	Hancock Putnam
33	Baldwin	Baldwin Wilkenson Washington
34	Jasper	Jasper
35	McDuffie	McDuffie Warren
36	Richmond	Richmond Columbia
37	Jefferson	Jefferson Glascock
38	Burke	Burke
39	Scroven	Screven
40	Bulloch	Bulloch Candler
41	Chatham	Chatham Effingham Bryan
42	Evans	Evans Tattnall

Figure E.3 Continued
Index of County Clusters, Georgia

Cluster Number	County/Cluster Name	Counties in Cluster
43	Toombs	Toombs Wheeler Montgomery Appling Bacon
44	Emanuel	Emanuel
45	Laurens	Laurens Treutlen Johnson Bleckley
46	Dodge	Dodge Telfair Jeff Davis
47	Ben Hill	Ben Hill Wilcox Irwin
48	Crisp	Crisp Dooly
49	Macon	Macon
50	Sumter	Sumter
51	Marion	Marion Taylor Schley
52	Muscogee	Muscogee Talbot Chattahoochee
53	Stewart	Stewart Webster
54	Quitman	Quitman
55	Early	Early Clay Calhoun Randolph

Figure E.3, Continued
Index of County Clusters, Georgia

Cluster Number	County/Cluster Name	Counties in Cluster
56	Dougherty	Dougherty Lee Baker Terrell
57	Mitchell	Mitchell
58	Decatur	Decatur Miller Seminole Grady
59	Brooks	Brooks Thomas
60	Colquitt	Colquitt
61	Cook	Cook
62	Worth	Worth
63	Tift	Tift Turner Berrier Lanier
64	Lowndes	Lowndes Echols
65	Ware	Ware Clinch Pierce
66	Coffee	Coffee Atkinson
67	Wayne	Wayne Brantley
68	Liberty	Liberty Long
69	Glynn	Glynn McIntosh
70	Camden	Camden Charlton

Table E.2

WITHIN-MEDICAID UTILIZATION BY COUNTY CLUSTER:
OUTPATIENT TOTAL DAYS OF CARE, GEORGIA 1983-1984

GEOGRAPHIC AREA	MEDICAID ENROLLMENT	NUMBER OF CASES	OBSERVED RATE	EXPECTED RATE 4/	OBS/EXP RATIO	ADJUSTED RATE 4/	SIGNIF. LEVEL 4/
TOTAL GEORGIA	684,701	3,213,327	4.69	4.39	1.000	4.39	1.000
BALDWIN	10,909	49,073	4.49	4.81	0.934	4.38	0.061
BARROW	4,277	26,428	3.17	5.03	1.227	5.73	0.001
BARTOW	9,285	19,963	4.25	4.75	0.894	4.20	0.001
BEN HILL	3,473	24,838	4.53	4.81	0.942	4.42	0.001
BIBB	30,853	130,726	4.23	4.70	0.901	4.23	0.001
BROOKS	9,371	36,592	3.90	4.38	0.833	3.91	0.001
BULLOCH	3,224	37,805	5.39	4.30	1.253	5.88	0.001
BURKE	5,277	23,013	4.92	4.53	1.031	5.07	0.001
CAMDEN	2,947	11,990	4.03	4.71	0.863	4.05	0.001
CARROLL	7,901	48,352	3.10	4.84	1.277	5.99	0.001
CATOOSA	7,427	32,856	4.42	4.82	0.917	4.30	0.001
CHATHAM	37,378	158,128	4.23	4.31	0.917	4.30	0.001
CLARKE	12,375	77,248	6.09	4.73	1.268	3.04	0.001
CLAYTON	7,758	50,637	3.32	4.74	1.377	6.46	0.001
COBB	12,562	38,332	5.43	4.90	1.103	5.20	0.001
COFFEE	5,195	34,035	6.55	4.78	1.370	3.43	0.001
COLQUITT	6,360	23,250	4.12	4.55	0.907	4.25	0.001
COOK	1,942	3,898	4.28	4.65	0.902	4.23	0.001
COWETA	5,917	24,378	4.11	4.58	0.899	4.22	0.001
CRISP	7,471	34,693	4.34	4.62	1.005	4.71	0.400
DE KALB	32,188	151,394	4.70	4.70	1.001	4.70	0.791
DECATUR	10,799	51,456	4.73	4.31	1.033	4.85	0.001
DODGE	3,040	30,693	5.08	4.80	1.057	4.93	0.001
DOUGHERTY	23,842	111,489	4.31	4.47	0.945	4.53	0.001
DOUGLAS	2,329	16,126	6.13	4.83	1.269	5.96	0.001
EARLY	7,596	44,113	3.80	4.31	1.258	5.91	0.001
EMANUEL	4,768	23,586	5.33	4.39	1.144	5.37	0.001
EVANS	4,730	20,002	3.86	4.73	1.330	3.28	0.001
FANNIN	3,362	21,352	3.35	5.07	1.252	5.88	0.001
FLOYD	14,157	33,478	3.77	4.73	0.797	3.74	0.001
FULTON	122,437	510,967	4.17	4.61	0.904	4.24	0.001
GLYNN	7,602	33,437	4.39	4.74	0.928	4.35	0.001
GWINNETT	4,743	31,157	6.53	5.03	1.305	6.12	0.001
HALL	7,780	39,815	5.11	4.98	1.026	4.82	0.001
HANCOCK	4,881	19,886	4.07	4.35	1.048	4.92	0.001
HARRIS	8,033	24,813	4.93	4.75	1.036	4.86	0.001
HART	6,213	33,393	5.37	4.85	1.106	5.19	0.001
HENRY	5,831	24,157	4.77	4.74	1.000	4.73	0.222
HOUSTON	7,675	34,324	4.47	4.38	1.042	4.89	0.001
JASPER	777	4,311	5.54	4.81	1.151	5.40	0.001

Table E.2 Continued

WITHIN-MEDICAID UTILIZATION BY COUNTY CLUSTER:
OUTPATIENT TOTAL DAYS OF CARE, GEORGIA 1983-1984

GEOGRAPHIC AREA	MEDICAID ENROLLMENT	NUMBER OF CASES	OBSERVED RATE	EXPECTED RATE a/	OBS/EXP RATIO	ADJUSTED RATE b/	SIGNIF. LEVEL c/
JEFFERSON	4,822	31,226	6.47	4.65	1.391	6.58	0.001
LAURENS	10,008	60,128	6.00	4.72	1.272	5.37	0.001
LIBERTY	4,502	20,284	4.42	4.54	0.973	4.57	0.001
LOWNDES	10,803	35,314	3.33	4.59	0.726	3.41	0.001
MACON	3,026	4,949	1.29	4.66	0.277	1.30	0.001
MARION	3,620	20,404	5.63	4.70	1.198	5.62	0.001
MC DUFFIE	4,563	21,896	4.73	4.83	0.981	4.65	0.178
MITCHELL	5,332	22,763	4.26	4.47	0.953	4.47	0.001
MUSCOGEE	26,618	95,559	3.59	4.65	0.771	3.62	0.001
NEWTON	8,051	42,497	5.27	4.68	1.125	5.28	0.001
PEACH	4,122	20,131	4.88	4.63	1.054	4.84	0.001
POLK	3,914	21,150	5.40	4.88	1.105	5.18	0.001
PULASKI	1,640	8,846	5.38	4.82	1.118	5.25	0.001
QUITMAN	505	2,787	4.75	4.75	1.001	4.70	0.941
RICHMOND	33,678	160,020	5.01	4.72	1.061	4.98	0.001
SCREVEN	4,756	23,801	5.08	4.75	1.052	4.94	0.001
SPALDING	6,583	26,146	3.97	4.73	0.829	3.89	0.001
STEPHENS	4,683	27,595	5.88	5.13	1.182	5.31	0.001
STEWART	2,054	8,361	4.36	4.64	0.940	4.41	0.001
SUMTER	5,821	27,358	4.61	4.56	1.012	4.75	0.046
TIFT	9,462	45,348	4.79	4.66	1.028	4.82	0.001
TOOMBS	10,151	57,616	5.67	4.73	1.200	5.63	0.001
TROUP	6,232	28,806	4.62	4.80	0.961	4.51	0.001
UPSON	8,530	38,487	4.50	4.75	0.948	4.50	0.001
WALTON	8,119	15,809	5.10	4.84	1.053	4.94	0.001
WARE	8,507	47,004	5.52	4.74	1.164	5.46	0.001
WAYNE	4,211	21,846	5.18	4.83	1.073	5.03	0.001
WHITFIELD	4,518	25,308	5.73	5.00	1.146	5.38	0.001
WILKES	3,255	15,871	4.87	4.78	1.036	4.86	0.001
WORTH	3,282	17,414	5.48	4.84	1.135	5.51	0.001

a/ The expected rate is the rate expected is the county Medicaid population if it had the same age and sex-specific utilization patterns as the statewide Medicaid population.

b/ The adjusted rate represents the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization.

c/ Statistical significance level of the difference between the observed and expected rates.

NOTE: All analyses are based on the population under age 65.

Figure E.4

WITHIN-MEDICAID OBSERVED VERSUS EXPECTED RATES
BY COUNTY CLUSTER: OUTPATIENT TOTAL UTILIZATION,
GEORGIA 1983-1984.

Figure E.5
Index of County Clusters, Michigan

Figure E.5, Continued
Index of County Clusters, Michigan

Cluster Number	County/Cluster Name	Counties in Cluster
1	Gogebic	Gogebic
2	Ontonagon	Ontonagon
3	Baraga	Baraga
4	Houghton	Houghton Keweenaw
5	Iron	Iron
6	Dickinson	Dickinson
7	Delta	Delta Menominee
8	Marquette	Marquette Alger
9	Schoolcraft	Schoolcraft Luce
10	Chippewa	Chippewa
11	Emmet	Emmet Mackinac Charlevoix
12	Cheboygan	Cheboyban Presque Isle
13	Otsego	Otsego Montmorency Crawford
14	Alpena	Alpena Alcona
15	Grand Traverse	Grand Traverse Antrim Benzie Leelanau Kalkaska
16	Manistee	Manistee

Figure E.5 Continued
Index of County Clusters, Michigan

Cluster Number	County/Cluster Name	Counties in Cluster
17	Wexford	Wexford
18	Osceola	Osceola
19	Roseommon	Roscommon
20	Ogeman	Ogeman Oscoda
21	Iosco	Iosco
22	Arenac	Arenac
23	Clare	Clare
24	Isabella	Isabella
25	Mecosta	Mecosta
26	Mason	Mason
27	Oceana	Oceana
28	Newaygo	Newaygo
29	Midland	Midland
30	Bay	Bay
31	Huron	Huron
32	Muskegon	Muskegon
33	Montcalm	Montcalm
34	Gratiot	Gratiot
35	Saginaw	Saginaw
36	Tuscola	Tuscola
37	Sanilac	Sanilac
38	Ottawa	Ottawa
39	Kent	Kent

Figure E.5, Continued
Index of County Clusters, Michigan

Cluster Number	County/Cluster Name	Counties in Cluster
40	Ionia	Ionia
41	Clinton	Clinton
42	Shiawassee	Shiawassee
43	Genesee	Genesee
44	Lapeer	Lapeer
45	St. Clair	St. Clair
46	Allegan	Allegan
47	Barry	Barry
48	Eaton	Eaton
49	Ingham	Ingham
50	Livingston	Livingston
51	Oakland	Oakland
52	Macomb	Macomb
53	Van Buren	Van Buren
54	Kalamazoo	Kalamazoo
55	Calhoun	Calhoun
56	Jackson	Jackson
57	Washtenaw	Washtenaw
58	Wayne	Wayne
59	Berrien	Berrien
60	Cass	Cass
61	St. Joseph	St. Joseph
62	Branch	Branch
63	Hillsdale	Hillsdale
64	Lenawee	Lenawee
65	Monroe	Monroe

Table E.3

WITHIN-MEDICAID UTILIZATION BY COUNTY CLUSTER:
OUTPATIENT TOTAL DAYS OF CARE, MICHIGAN 1984-1985

GEOGRAPHIC AREA	MEDICAID ENROLLMENT	NUMBER OF CASES	OBSERVED RATE	EXPECTED RATE 4/	OBS/EXP RATIO	ADJUSTED RATE 4/	SIGNIF. LEVEL 4/
TOTAL MICHIGAN	1,085,949	8,490,781	5.24	5.25	1.000	5.25	1.000
ALLEGAN	11,013	58,407	5.30	5.24	1.011	5.31	0.009
ALPENA	9,549	49,149	5.09	5.15	0.987	5.18	0.009
ARENAC	4,565	24,917	5.92	5.14	1.036	5.44	0.001
BARAGA	2,047	9,022	4.40	5.13	0.858	4.51	0.001
BARRY	7,022	36,058	5.24	5.20	1.009	5.30	0.086
BAY	25,564	133,655	5.01	5.29	1.149	6.04	0.001
BERRIEN	42,791	294,950	5.49	5.23	1.048	5.51	0.001
BRANCH	7,908	40,942	5.18	5.23	0.975	5.12	0.001
CALHOUN	37,816	198,330	5.25	5.22	1.002	5.26	0.456
CASS	9,075	44,980	4.95	5.24	0.949	4.96	0.001
CHARLEVOIX	3,165	13,924	4.39	5.28	0.832	4.37	0.001
CHEBOYGAN	6,874	37,204	5.67	5.28	1.074	5.64	0.001
CHIPPEWA	6,662	28,277	4.24	5.29	0.810	4.25	0.001
CLARE	15,215	82,992	5.49	5.12	1.065	5.59	0.001
CLINTON	5,059	30,627	6.05	5.27	1.147	6.02	0.001
DELTA	11,276	50,171	4.44	5.28	0.894	4.49	0.001
DICKINSON	3,364	16,946	5.03	5.37	0.937	4.92	0.001
EATON	8,729	47,221	5.40	5.28	1.023	5.37	0.001
EMMET	3,808	16,109	4.75	5.23	0.908	4.77	0.001
GENESEE	125,499	647,640	5.16	5.24	0.984	5.17	0.001
GOGEBIC	4,225	15,167	3.58	5.15	0.697	3.66	0.001
GRAND TRAVERSE	15,449	91,060	5.50	5.23	1.066	5.60	0.001
GRATIOT	7,351	40,146	5.46	5.23	1.042	5.47	0.001
HILLSDALE	8,679	45,275	5.22	5.14	1.015	5.39	0.002
HOUGHTON	7,095	31,434	4.42	5.17	0.857	4.50	0.001
HURON	5,378	30,753	5.71	5.19	1.100	5.78	0.001
INGHAM	53,070	263,599	4.91	5.25	0.935	4.91	0.001
IONIA	8,270	39,360	5.45	5.20	1.221	5.41	0.001
IOSCO	4,984	24,407	4.89	5.22	0.897	4.92	0.001
IRON	1,799	9,612	5.34	5.28	1.011	5.31	0.264
ISABELLA	9,127	52,935	5.80	5.20	1.114	5.85	0.001
JACKSON	30,484	160,061	5.51	5.24	1.052	5.52	0.001
KALAMAZOO	34,371	185,362	5.39	5.26	1.014	5.32	0.001
KENT	67,392	315,960	4.69	5.39	0.871	4.97	0.001
LAPEER	11,072	72,313	6.14	5.27	1.164	6.12	0.001
LENAWEE	19,286	81,970	5.36	5.24	1.022	5.37	0.001
LIVINGSTON	8,885	40,363	5.44	5.28	1.029	5.41	0.001
MACKINAC	2,022	7,226	3.57	5.24	0.681	3.58	0.001
MACOMB	88,924	364,468	8.18	5.39	1.146	8.02	0.001
MANISTEE	4,825	20,351	4.21	5.11	0.825	4.33	0.001

Table E.3, Continued

WITHIN-MEDICAID UTILIZATION BY COUNTY CLUSTER:
OUTPATIENT TOTAL DAYS OF CARE, MICHIGAN 1984-1985

GEOGRAPHIC AREA	MEDICAID ENROLLMENT	NUMBER OF CASES	OBSERVED RATE	EXPECTED RATE a/	OBS/EXP RATIO	ADJUSTED RATE b/	SIGNIF. LEVEL c/
MARQUETTE	11,867	52,648	4.42	5.27	0.839	4.41	0.001
MASON	4,037	23,372	4.33	5.16	0.838	4.90	0.001
MECOSTA	3,301	45,076	4.86	5.16	0.941	4.64	0.001
MIDLAND	11,696	67,736	5.78	5.13	1.127	6.62	0.001
MONROE	22,476	126,189	6.74	5.24	1.286	5.76	0.001
MONTCALM	3,233	55,024	5.65	5.24	1.136	5.97	0.001
MUSKEGON	42,651	257,221	5.98	5.26	1.137	6.67	0.001
NEWAYGO	7,388	44,699	5.66	5.21	1.087	5.71	0.001
OAKLAND	96,253	577,247	5.99	5.33	1.125	5.91	0.001
OCEANA	5,803	31,790	5.47	5.20	1.052	5.52	0.001
OGEMAW	7,340	40,667	5.54	5.20	1.065	5.56	0.001
ONTONAGON	1,682	7,785	3.92	5.14	0.763	4.00	0.001
OSCEOLA	6,776	32,946	4.86	5.13	0.646	4.67	0.001
OTSEGO	7,655	41,682	5.27	5.15	1.024	5.38	0.001
OTTAWA	3,886	52,626	5.35	5.32	1.006	5.28	0.184
ROSCOMMON	4,606	23,725	4.83	5.20	0.929	4.88	0.001
SAGINAW	62,006	283,598	4.57	5.20	0.879	4.61	0.001
SANILAC	7,660	44,576	6.01	5.10	1.122	6.89	0.001
SCHOOLCRAFT	3,607	14,847	4.02	5.15	0.781	4.10	0.001
SHIAWASSEE	13,296	78,053	6.07	5.17	1.135	5.96	0.001
ST. CLAIR	30,216	167,118	5.53	5.24	1.055	5.54	0.001
ST. JOSEPH	3,356	45,143	4.32	5.25	0.816	4.02	0.001
TUSCOLA	10,621	67,654	5.27	5.17	1.019	5.35	0.001
VAN BUREN	17,853	104,633	5.86	5.17	1.132	6.95	0.001
WASHTENAW	30,537	177,331	5.02	5.33	1.093	5.74	0.001
WAYNE	647,295	3,272,703	5.05	5.25	0.962	5.05	0.001
WEXFORD	5,273	27,108	5.18	5.25	0.977	5.18	0.001

a/ The expected rate is the rate expected in the county Medicaid population if it had the same age and sex-specific utilization pattern as the statewide Medicaid population.

b/ The adjusted rate represents the county-level Medicaid rate adjusted to the statewide Medicaid age and sex distribution by the method of indirect standardization.

c/ Statistical significance level of the difference between the observed and expected rates.

NOTE: All analyses are based on the population under age 65.

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